IV. REMARKS

6. The Office Action dated May 02, 2005 has been carefully considered. Amended claims are submitted with this Request for Continued Examination (RCE). Reconsideration of this application, as amended and in view of the following remarks, is respectfully requested.

A. References

7. The following U.S. patents were considered in the office action:

- US Patent 5,715,823 ("Wood"), filed September 25, 1996
- US Patent 5,882,206 ("Gillio"), filed March 29, 1995
- US Patent 5,920,317 ("McDonald"), filed June 11, 1996
- US Patent 6,009,346 ("Ostrow"), filed January 2, 1998

8. The following U.S. patents were cited by the applicant:

- US Patent No. 5,619,995, Lobodzinski, filed April 15, 1997, ("Lobodzinski " or "Lobod" for short)
- US Patent No. 5,046,027, Taffe et al., filed September 3, 1991, ("Taffe")

9. Several articles are attached as Exhibits to this paper and listed in an accompanying Information Disclosure Statement. These articles shed light on the state of the art before and after the present invention.

B. Overview of Office Action

10. The office action:

- rejected claims 1-7, 23-27, 33-37 as being obvious in light of Wood in view of McDonald, under 35 U.S.C. 103(a)

- rejected claims 32, 38-43 as being obvious in light of Wood in view of McDonald, and further in view of Gillio and Ostrow under 35 U.S.C. 103(a)

C. Hybrid Art

11. The present invention is a hybrid of at least three arts: video compression, Internet video streaming, and medical imaging. While some of the elements of the present invention were known in each of the various art areas, at the time of the present invention the combination of these three art areas was at its dawn and there were considerable difficulties, unsolved problems, and skepticism regarding the ability of the Internet to transmit medical quality live video, especially over the bandwidth available over ordinary telephone lines.

D. PRIOR ART—Digital Video Compression—MPEG, etc.

12. Various techniques of video compression were known in the art. Initially computers were too slow to achieve high levels of compression in real time. The best compression methods, such as Cinepak, required hours to compress a few minutes of video that could be played back from a local CD-ROM. Another popular standard is MPEG. There are many versions of MPEG, some of these have been standardized such as MPEG-1, MPEG-2, and MPEG-4. In spite of standardization of some aspects of MPEG, there are many proprietary extensions that are included in the MPEG family of compression techniques. This is an area of crowded art as evidenced by numerous MPEG related patents, such as Chen 4,698,672, 4,704,628, 6,335,990 and Zhang 6,181,711 which have already been cited by the applicant in this case. Even today MPEG related patents continue to be issued regularly.

13. At the time of the present invention, MPEG encoding could be achieved in real time using specialized hardware, known as MPEG encoding cards. While software based decoders existed, the quality of the decoded image was arguably not medical quality.

14. Note that MPEG is a compression format and that the use of MPEG (e.g. by McDonald) does not necessary imply that video streaming over a network is possible.

E. PRIOR ART—Internet Video Streaming

15. In addition to the compression and decompression techniques, Internet streaming technology was developed by 1995. Video could be digitized and pre-compressed using MPEG or other compression techniques. Using video streaming technology that included buffering, prerecorded video could be transmitted over the Internet and generally displayed at the same rate that it was received.

16. However, in late 1997 there were still many problems and challenges to be overcome. The Electronic Engineering Times, attached as Exhibit 1, reported, "Streaming video and audio products have gained attention on the Web, but many of the products still fall short of user expectations when utilized on the Internet. ... the performance of first-generation products, particularly over the Internet, has often fallen short of user expectations. ... Successfully transmitting video and audio over the Internet, and even over private intranets, poses major technology challenges. ... MPEG-1 and 2 were designed for CD-ROM and commercial broadcast delivery, respectively. They offer excellent clarity and motion representation, but they do not fare well at transmission speeds significantly less than 1 Mbit/s. ... As severe as the bandwidth constraints are, they are not as big a problem for streaming video as are the Internet's standard transport mechanisms and protocols. The Internet is a vast router network that exhibits

tremendous variability in terms of throughput, congestion and end-to-end delay. ... Streaming video faces some tough challenges..." (See Exhibit 1).

17. PRIOR ART—Live Video Transmission

18. Streaming video techniques overcome some of the problems inherit in trying to stream video over the Internet by buffering a number of frames. However, this kind of buffering introduces a delay of a second or two. Truly live video, especially that required by the real-time control and guidance that is an aspect of the present invention, cannot tolerate this kind of delay.

19. While video with a reasonable quality could be transmitted live over a local area network (LAN) (e.g. Ethernet, 10 Mbits/s), the quality over a slower wide area network (WAN) such as the Internet was poor: containing little image detail, a high level of compression artifacts, reduced dimensions (e.g. less than 320 x 240), and/or inconsistent, jerky frame rates, less than 8 frames per second.

F. PRIOR ART—Medical Video File Transfer

20. Because of the problems associated with Internet streaming of video, including poor image quality, low resolution, compression artifacts, and unreliable motion delivery, the medical community was not able to use the Internet for either live transmission or streaming of medical video. Instead as cited in applicant's previous response, conventional video feeds using satellite or other high bandwidth networks were used. (See "Satellite links Mayo Clinic, Jordan hospitals" Exhibit A in the response dated February 11, 2005). Further, the industry was undergoing a movement toward standards for data interchange, including DICOM and HL/7. These standards did not support formats that could be streamed or transmitted live

over the Internet.[1] Medical video interchange over the Internet was limited to pre-recorded, store-and-forward techniques. This is evidenced by the patents cited so far as prior art.

21. Wood teaches a medical test device (such as an ultrasound diagnostic imaging system), a transmitter (such as an HTTP server), connected over an Internet network connection to a remote receiver (such as a computer running a web browser). In Wood the remote user could update the screen to receive a new still image of the screen on the medical test device and could download still images and pre-recorded cineloops as files. However Wood did not teach that the medical video images could be streamed across the Internet or that the system supported live transmission of medical video.

22. McDonald specifically teaches the use of MPEG compression in storing medical video to digital files. McDonald teaches a client/server architecture that operates over a WAN, including the Internet. McDonald teaches that the pre-recorded files can be transferred over the Internet for later review, *not live viewing*. McDonald taught that hardware encoding was required at the server and hardware decoding was required at the client. However McDonald did not teach that the medical video images could be streamed across the Internet or that the system supported live transmission of medical video.

23. Although not cited by the Examiner, applicant points out that Lobodzinski (or Lobod for short) taught that pre-recorded medical video could be transferred (exchanged) over a network using store-and-forward provisions such as DICOM (Lobod 6;14-17). However one of

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[1] See "Standards Update" side article in PACS and Networking News, Exhibit 14. Note that in March 2000, DICOM is exact in length specifications and defines types for encoding image pixels, while HL/7 is "strictly

skill in the art would understand that DICOM standard formats did not support the streaming of medical video images across the wide area network. DICOM only supported store-and-forward and less than real-time still image transmissions. Lobod teaches that hardware encoding was required at the server in order to achieve real-time storage of digital video to a disk. Lobod further teaches that live video can be displayed locally (Lobod 13:48-54). However, Lobod teaches, "A bandwidth of 15 Mbps (e.g. Ethernet protocol) is sufficient for real-time compressed video transmission." (Lobod14:19-23) Lobod taught that live video can only be transmitted over a LAN, and thus teaches away from live video transmission over a WAN such as the Internet where the bandwidth is less than 15 Mbps.

G. PRIOR ART—Telesurgery

24. Gillio discloses a virtual surgery system that can send simulation data over the Internet. However, in order to use the virtual surgery system as an aid in telesurgery, the remote surgeon must receive the patient video through a separate video feed, such as satellite television. (See detailed analysis in previous response and "Satellite links Mayo Clinic, Jordan hospitals" Exhibit A in the response dated February 11, 2005). Gillio only clearly teaches that the lower bandwidth simulation data and robotic control commands are sent through the data network such as the Internet. The patient medical video travels over a video feed that is separate from the simulation data feed.

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character-based".

H. State of the Hybrid Art—"Nothing more than toys"—June 1998

25. The state of the art for transmission of medical quality video is further evidenced by the analysis of Healthcare Informatics Online, June 1998, attached as Exhibit 2. The reference starts out by teaching, "Where voice, data, and images have previously traveled down different transportation channels it is now *becoming* possible to send all types of data across a single communications medium at a lower cost". It reports, "Cisco Systems and Acuson Corp. have been staging high-profile demonstrations[2] of an application for viewing ultrasound images remotely over the Internet. Using a Web browser, Acuson's WebPro package allows users to pull entire exams over the Internet..." (emphasis added). This store-and-forward of prerecorded files containing entire exams was the state of the art in June 1998.

26. The analysis further reports that the Department of Defense (DoD) had several Internet-enabled telemedicine studies underway. "An Internet-based teledermatology system at Walter Reed Army Medical Center in Washington, D.C...[u]sing an inhouse-developed system, ...will be able to send ... digital photos over the Internet..." (Exhibit 2, emphasis added). This store-and-forward still image transfer was the state of the art of Navy telemedicine in June 1998.

27. Regarding video transmission, Exhibit 2 further describes a recent DoD contractor, Strategic Monitoring Services, Inc. (SMS), which provides Internet based access to medical records and the use of Web TV for patient education (but not medical imaging). SMS's

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[2] See RSNA November 1998 below for more details of later demonstrations.

CEO states, "Truly interactive, data rich disease management is not there yet for the DoD or anyone else...".

28. Stanford was also using "ISDN-based educational videoconferences" and is "now looking" to provide "prerecorded lectures" using "video streaming over the Internet" (Exhibit 3, emphasis added). The use of dedicated videoconferencing transmission channels (such as "circuit switched ... ISDN lines") was state of the art and streaming of pre-recorded educational was being developed in June 1998.

29. Looking forward from June 1998, the reference teaches "DSL uses a dedicated, packet-switched connection found in frame relay, ATM, or IP networks... Because DSL uses ordinary phone lines, it may be a viable option... But its future is tied closely with the phone companies, which are still deciding when and how to offer it." (Exhibit 2, emphasis added).

30. Further, looking forward, "real-time Internet-based video is becoming a reality." Fletcher Allen Health Care was looking at "IP multicasting, a networking protocol that broadcasts one video file through a network and allows multiple subscribers to tune in using the same bandwidth." Fletcher Allen envisioned multicasting using ISDN lines. Fletcher Allen's CIO stated "That technology (ISDN) is going to be a good standard for quite a long time..." Further he "admits that most Internet video applications are *nothing more than toys*, and the industry is still working on standards for sending video over an IP network."

I. State of the Hybrid Art—RSNA November 1998

31. The state of the art for transmission of medical quality video is further evidenced by the news of the November 30, 1998, Radiological Society of North America

(RSNA) meeting. This event occurred several months after the priority date of the present invention. The RSNA meeting is recognized by those in the art as one of the top showcases for the latest in medical technology. As reported by PR Newswire, attached as Exhibit 3, "Viewers of this telediagnostic transmission, conducted by Acuson and telecommunications leaders, Cisco Systems, Optivision and Ameritech, will be able to observe Waddle's musculoskeletal structure (his knee, shoulder, and elbow) live during his ultrasound exam at Loyola." Note that Loyola (the transmitter) is less than 20 miles from the meeting site (the receiver) and that the transmission was over special "fiber optic lines" providing a high bandwidth connection "DS-3 (45 megabit-per-sec bandwidth) asynchronus transfer mode [ATM] connection provided by Ameritech". (Exhibit 3).

32. Thus, long after applicant's invention, the state of the hybrid art, as practiced by medical imaging leader, Acuson; video streaming leader, Optivision; and network leaders Cisco and Ameritech; did not support live transmission of medical quality video over conventional Internet connections with bandwidths less that 15 Mbps.

J. State of the Hybrid Art—Health Data Management March 2000

33. The state of the art for transmission of medical quality video is further evidenced by the detailed analysis provided in Health Data Management on March 1, 2000, attached as Exhibit 4 (emphasis added):

34. "Telemedicine offers health care some of the best examples of using networking technology to better serve patients. Few visions are more compelling than physicians using real-time, interactive video to provide consultations, make diagnoses and even lend assistance during surgeries. ... These integrated delivery systems and hospitals use dedicated,

point-to-point, proprietary networks to offer interactive telemedical services and transmit large, digitized image files in seconds. But these telemedicine programs are limited in scope because dedicated network connections are expensive, ...

35. "For many CIOs and telemedicine program leaders, the question becomes: When will the clear majority of telemedicine executives' concerns about the Internet finally be allayed, ...?

36. "Telemedicine providers and other experts say the Internet as it is today has technical limitations and security issues that limit its effectiveness as a network backbone for many telemedicine programs. A lack of bandwidth and inadequate quality of network service, for example, make it *difficult to run live video and audio feeds, or even move large image files across the Internet in a timely fashion.* ... There are fundamental problems with using the Internet. ...

37. "Two of the biggest issues are transmission speed and quality of service. The Internet often is too slow and unreliable for many telemedicine services, such as interactive video consultations. A lack of bandwidth creates bottlenecks in the Internet that slow data transfers. ...

38. "As a result of insufficient bandwidth, video and audio transmissions do not flow smoothly and uninterrupted across the Internet. In addition, large image files can take hours to travel across the Internet, an unacceptable delay if a physician has to render assistance based on that image in an emergency situation.

39. "Most telemedicine programs using the Internet today avoid these problems by operating store-and-forward telemedicine systems. These systems enable physicians to

transmit via the Internet text, audio and video clips, and digital images that are not time-sensitive, typically as e-mail attachments. ...*But store-and-forward does not enable physicians to provide real-time services, such as interactive video teleconsultations.* And that's a major drawback.

40. "The 'last mile' refers to the line that links a PC or workstation to the Internet, or to the line that links a PC or workstation to a local or wide area network that then links to the Internet. These connections--often a dial-up modem or an Integrated Services Digital Network [ISDN] line--typically are *too slow* to deliver large image files and live video and audio feeds to the desktop in real time. In other words, it's not the backbone of the Internet that's the problem, it's the health care organization's link to the Internet. ...

41. "There always is an issue with time delays--but we're using a public network, and we take what we can get, ... But I don't see any use for interactive services, such as telesurgery, until there's widespread deployment of high-bandwidth connections between computers and the Internet. ...

42. " ... But even with ample bandwidth, the Internet still does not always provide the quality of service necessary for video and audio to be transmitted in a timely fashion. Quality of service, a term coined by the telecommunications industry, refers to the performance of a network measured by the number of data packets lost or "dropped" during transmission.

43. "...As a result, live video and audio feeds, as well as digital images, cannot be transmitted with the same degree of assurance. ...

44. "But even with these [ATM and T1] high-band-width connections, ...[t]his delay or loss of packets of data can cause interruptions in video and audio feeds, ...

45. "... Existing protocols might do wonders for Web sites and e-mail, but telemedicine is a different story altogether." (Exhibit 4, emphasis added)

K. Applicant's Invention Solves Many Problems with Solutions that were not Anticipated nor Rendered Obvious by the Prior Art

46. As discussed above, there were many problems known in the art regarding the live transmission of medical quality video over the Internet, especially when the available bandwidth was substantially less than 15 Mbps, such as 1.54 Mbps T1 through 56Kbps or less modems. These problems included:

- poor image quality because of high levels of lossy compression and compression artifacts
- small image dimensions which lack adequate detail
- unreliable throughput
- congestion leading to lost packets
- end-to-end delay or latency
- low bandwidth to homes and remote clinics
- inability to control compression and transmission options
- inability to have transmission parameters that are different and separate from recording parameters (e.g. frame rate, image dimensions, and compression method)
- inability to control and assure quality of a study while it is being performed and then download the recorded video file later to see highest quality
- lack of lossless compression methods that yield high compression ratios, especially methods that are optimized for medical images, such as ultrasound

- lack of disclosure of errors and notification of periods of less than medical quality transmission
- inability to transmit live medical quality video of low bandwidth network connections
- inability to transmit live medical quality video over standard phone lines
- excessive use of storage space by recording unneeded video segments
- lack of security for medical video access
- lack of immediate access to medical video studies
- long turnaround between performing a study and being able to schedule surgery
- suboptimal studies being performed causing the specialist to make a lower quality or confidence report, or causing the patient to return for repeated studies
- lack of the ability to transmit video to a plurality of remote users based using independently specified settings
- lack of ability to move the transmitter from one medical diagnostic device to another medical test device, multiplying its use and providing for the system to be provided on a separate purchase or lease basis
- lack of ability to attaché to any make or model of ultrasound imaging device
- lack of ability for the transmitter to serve as a standalone server while the expensive medical diagnostic devices are used for other local diagnoses
- inability to remotely guide and mentor a technician

- lack of a remote surgery system where the patient medical video and the remote control command and other data travel over the same low cost, readily available transmission channel

47. One aspect of the present invention is that a physician viewing from a remote location can dynamically select compression options that will vary the effective compression ratio. Varying these compression options allows optimum motion or image quality to be achieved for a given bandwidth capability. Higher compression ratios allow for high frame rates, which increase motion fluidity in the image stream. Over slower Internet connections, the physician can balance the tradeoffs between frame rate (motion) and image quality (dynamic range and color enhancement) to achieve the optimal image in a given circumstance.

48. Another aspect of the present invention is that the user can control the transmitter and its video capture and compression parameters remotely. The viewing clinician can remotely adjust the brightness, contrast, hue, etc. and fine-tune the compression options (compression method, capture rate, transmission rate, image height and width, and image area) so that the best compromise between transmission speed, bandwidth requirements, frame rate, and diagnostic quality can be selected during live viewing to yield optimum image quality.

49. Another aspect of the present invention is that the compression algorithm can be implemented in the compressor as a software encoder, and still meet the timing requirements of live transmission.

50. Another aspect of the present invention is that the compression algorithm can be implemented in the decompressor as a software decoder, and still meet the timing requirements of live receipt, display and control.

51. Another aspect of the present invention is the ability to have remote robotic control over the same network transmission channel that a live video transmission is being received.

52. Another aspect of the present invention is the ability to record a high quality image for permanent record while controlling recording with a lower quality image. This further allows the high quality video to be transferred for later review even over a very slow network connection such as a 56Kbps or less modem.

53. Another aspect of the present invention is the ability to removeably attach the transmitter to any medical test device, allowing one transmitter to be shared among multiple medical test devices and to serve as a standalone transmitter while the medical test devices in use with local studies.

54. Another aspect of the present invention is notification of the remote user when the video being received and display fails to meet requested quality. The quality notification allows the user to use remote control commands to alter the transmitter in order to achieve and maintain required quality.

L. The Combination of the Prior Art Fails to Render Obvious the Applicants Invention

55. As discussed above, even if it were proper to combine Wood, McDonald, Lobod, and Gillio, many aspects of the present invention would be missing and would not have been suggested by the invention as currently claimed. As discussed in the previous response, Ostrow when properly understood only teaches preprogrammed robotic control of an ultrasound device and is not properly combined with the other cited art.

M. Government Recognition—FDA "first live medical video transmission"

56. Various embodiments of the present invention was licensed to IntraCom Corporation and included in its EchoLive™ and MedEcho™ product lines. When the initial FDA clearance was granted, the FDA examiner informed the primary inventor, Kendyl Román, that these products were the first medical video transmission devices capable of live medical video transmission over the Internet. This is also supported by announcements by The Wall Street Transcript (Exhibit 5), radiologybiz.com (Exhibit 7), the Health Industry Distributors Association (HIDA) (Exhibit 8), Diagnostic Imaging Online (Exhibit 13), PACS and Networking News (Exhibit 14), and several others.[3]

57. The Media and Technology section of the San Fernando Valley Business journal, reported in March 20, 2000, that the IntraCom "is the only company yet to win FDA approval for its system. Hewlett Packard and makers of ultrasound machines are working on similar technology." (Exhibit 15, emphasis added).

N. Professional Recognition—First Transcontinental Live Transmission of Ultrasound through the Internet

58. As reported in Exhibit 5, "In May of 1999, [IntraCom] did the first coast-to-coast live transmission of an ultrasound exam through the Internet from Sunnyvale, California, to physicians at Walter Reed Hospital in Washington, DC." (emphasis added). In contrast, the previous year, the Surgeon General of the Navy reported to the Senate that the "most advanced treatment facility in the fleet" had used satellite Video Teleconferencing (VTC) to "monitor a

[3] See also Exhibits 9, 10, 11, 12, and 16.

live ultrasound study" where the remote radiologist "clarified the imaging artifacts" (See Exhibit 18, April 1, 1998).

O. Professional Recognition—First Trans-Atlantic Live Transmission of Ultrasound through the Internet

59. As further reported in Exhibit 5, "Then in September of 1999 [IntraCom] did the first trans-Atlantic transmission of live ultrasound over the Internet from St. Petersburg, Russia, to Bethesda, Maryland and Sacramento, California" (Exhibit 5, emphasis added). The article goes on to state that the system was being offered for purchase at $65,000 or at a $750 monthly subscription.

60. This first intercontinental transmission was also recognized and reported in Heart to Heart , attached as Exhibit 6, "In a collaborative venture with IntraCom of Alameda, CA and the medical Academy for Postgraduate Studies of St. Petersburg, Heart to Heart assisted in sending the first live international transmission of echocardiographic images via the internet in September 1999." (Exhibit 6, emphasis added). Heart to Heart further announced that they were seeking funding of $100,000 so they could "enable Russian physicians to have the technical capacity to transmit/receive echocardiographic images on a permanent basis."

P. Professional Recognition—Live, Real-time Lifesaving

61. The invention was further recognized by the press and experts in the field. The Los Angeles Daily News, attached as Exhibit 9, announced "MedEcho will enable a doctor to view a live ultrasound image over the Internet from a remote location...Being able to do those live transmissions on a real-time basis is really a lifesaving technique." (Exhibit 9, emphasis added).

Q. Professional Recognition—First and Only to Use the Internet

62. The Sacramento Business Journal, attached as Exhibit 10, reported: "IntraCom appears to be the first to send ultrasounds over the Internet...MedEcho [transmits] full-motion diagnostic images across the Internet...While other firms such as Mountain View-based Acuson Corp provide complex systems to display, archive, and retrieve ultrasound images, IntraCom is the only outfit seeking to use the Internet for this purpose... (Exhibit 10, emphasis added).

R. Professional Recognition—Smead: "Speedier reading and turnaround for surgery"

63. Wanda Smead, telemedicine coordinator at rural Colusa Community Hospital, said "It'll enable patients to get a speedier reading and turnaround for surgery" Exhibit 10, further reported, "MedEcho would eliminate lag time, giving a physician immediate access to the test."

S. Professional Recognition—Nemana: "Beautiful...before its time"

64. Ravi Nemana, lead technologist for the telemedicine program at University of California—Davis, said "This is a bold move in a conservative healthcare environment...The idea is beautiful, although probably a little before its time." (Exhibit 10, emphasis added).

T. Professional Recognition—DuBose: "This technology is coming"

65. Terry DuBose, project director of the Diagnostic Medical Sonography Program at University of Arkansas, said, "This technology is coming—its going to happen. My fear is that it's very operator dependent. No matter how good the person is at the other end [location of the medical device], you can only access what you see." (Exhibit 10, emphasis added). His comments underscore the importance of having the remote physician being able to

guide the technician to get the proper image; live video feedback is required to make this happen. His comments also confirm that the technology was missing in the state of the art even in 2000.

66. Ravi Nemana and Terry DuBose were also quoted in The Business Journal, Serving San Jose and Silcon Valley, attached as Exhibit 11.

U. Professional Recognition—DuBose: Unlike others can be added to any ultrasound machine

67. Also Terry DuBose, who also was a technology analyst for the Society of Diagnostic Medical Sonographers, said that, by 2000, other companies had produced ultrasound machines that could transmit images on the Internet, "unlike MedEcho, their technology cannot be added to any other ultrasound machine." (Exhibit 12, emphasis added). Because, in some embodiments of the present invention, a transmitter may be attached to the medical test device via a standard video output, a single transmitter can be shared among many medical test devices, including different types of medical test devices. The standalone transmitter can still be accessed when the medical test device is being used from other local diagnoses. This also opened the door for lower cost monthly leasing of the transmission system as opposed having its costs added to the capital cost of the medical test device.

V. Professional Recognition—Diagnostic Imaging: "Internet-based real-time ultrasound a reality...lossless...full-size, full-motion...over standard phone lines"

68. Diagnostic Imaging Online, in an article entitled, "Software package makes Internet-based real-time ultrasound a reality", attached as Exhibit 13, reported, "Using a lossless wavelet-based approach optimized for ultrasound, MedEcho can transmit full-size, full-motion video images at 15 frames per second or better over standard telephone lines. Physicians on the receiving end can retrieve selected segments in the original full-resolution image file. They can

also view exams in progress and guide the technician or physician acquiring the image to obtain the best diagnostic views." (Exhibit 13, emphasis added).

W. Professional Recognition—PACS & Networking News: "First Internet-based system...for real-time, full-motion ultrasound"

69. PACS & Networking News, attached as Exhibit 14, reported, "MedEcho is also the first Internet-based system developed specifically for real-time, full-motion ultrasound imaging... This is *not something that can just be pulled off the shelf* because you lose frames or resolution" (Exhibit 14, emphasis added).

X. Professional Recognition—Wong: "Need almost broadcast quality video"

70. The San Fernando Valley Business Journal, attached as Exhibit 15, reported "Until recently, it had been impossible to send diagnostic quality moving images over the Internet because the wasn't sufficient bandwidth to accommodate moving pictures with the necessary detail." (Exhibit 15, emphasis added).

71. Dr. Pierre Wong, director of cardiology at Children's Hospital, Los Angeles, said, "For pediatrics, the diagnostic quality is so rigorous... With fast heart rates of kids, you need almost broadcast quality video. ...The additional speed [i.e. 30 frames per second] is mandatory for physicians to accurately diagnose a patient....It's such an early technology and its still coming into its own." (Exhibit 15, emphasis added)

Y. Professional Recognition—Reid: "Moving images...difficult"

72. Dr. Cheryl Reid, associate professor of medicine at University of California—Irvine (UCI) Medical Center had been using the system for several weeks by March 20, 2000, when she said, "It's able to transmit moving images, which is difficult to do with ultrasounds...Up to now, the Internet has been used primarily in radiology to transmit still

images." (Exhibit 15, emphasis added). Dr. Reid has used version of the system for many years in her clinical work at UCI.

Z. Government/Professional Recognition—Schiller: "Much clearer than videotaped recordings"

73. Hospitals & Health Networks, attached as Exhibit 16, reported, "The digital ultrasounds can be sent in live or as a recording...doctors could use MedEcho to help a technician conduct a live echocardiogram at a distant location." (Exhibit 16, emphasis added)

74. Dr. Nelson Schiller is a cardiologist and director of the Veterans' Administration Medical Center in San Francisco. He and other physicians at the VA medical center and at the University of California—San Francisco (UCSF) had tested MedEcho for a year. He said "MedEcho cuts the time it takes to get results on the average cardiology patient from a week to a couple of days. And the images are much clearer than the videotaped recordings that doctors currently use...the opportunity to view test results offsite enables a doctor to be a consultant to anyone, anywhere in the world...It's a real dot.com solution" (Exhibit 16, emphasis added). Dr. Schiller further pointed out the benefit of creating the opportunity for lucrative second opinion revenue.

AA. Professional Recognition—Medical & Healthcare Marketplace Guide

75. In 2002, the Medical & Healthcare Marketplace Guide published a lengthy market summary on what by then had become known as "e-Health: Health Information on the Internet", attached, in part, as Exhibit 17. The e-Health summary listed IntraCom citing MedEcho's ability to "transmit ultrasound images in real time over the Internet" (Exhibit 17, emphasis added). Even as late as 2002, other companies associated with medical video transmission, including Daou, Global Telemedix, iPhysician, and VirTx, were not indicated as

being able to transmit live, diagnostic quality medical video over the Internet. Daou was still providing separate data, voice, and video networking solutions. Global Telemedix all Internet consulting with "still images, video clips, and DICOM studies such as ultrasound", which apparently were pre-recorded files rather than live transmission. iPhysician was an educational videoconferencing system. VirTx also provided video conferencing. (Exhibit 17, emphasis added).

BB. Claim Amendments

76. Claims 1 and 23 have been amended to include network limitations originally found in claims 6 and 25; claims 6 and 25 have been canceled. Claims 2-4 have also been amended. Claims 7 and 26 were amended to be dependent on claims 1 and 23, respectively, which now include the network limitation of canceled claims 6 and 25. Claims 23, 27, 33, 37-43 also were amended. The other original claims or previously presented claims depend on an amended claim. Thus reconsideration of each of the amended claims is requested, especially in light of the foregoing remarks and attached Exhibits which provide evidence of the novelty and non-obviousness of the invention as now more distinctly claimed.

77. The claims were amended to correct various grammar and punctuation errors and to more distinctly claim the invention. No new matter was added.

CC. Specification Amendments

78. A paragraph was added to incorporate novel matter contained in provisional application, said matter having already been incorporated by reference. This admendment was made to provide antecedent support for the claim amendments in the body of the amended specification. No new matter was added.

V. CONCLUSION

79. The undersigned respectfully submits that, in view of the foregoing amendments and remarks, the present application is believed to be in condition for allowance. It is respectfully requested that this application be considered and that this case be passed to issue. If it is believed that a telephone conversation would expedite the prosecution of the present application, or clarify matters with regard to its allowance, the Examiner is invited to call the undersigned at 408-739-9517.

Respectfully submitted,

Date: October 28, 2005

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Title: Streaming video on the Net gains speed. (Internet/Web/Online Service Information)

Date: 11/17/1997; **Publication**: Electronic Engineering Times; **Author**: Adelson, Joshua

Streaming video and audio products have gained attention on the Web, but many of the products still fall short of user expectations when utilized on the Internet. The technology holds great promise since the internet is becoming a strategic information infrastructure for individuals and organizations. Video and audio are also appealing since they are very familiar due to film, radio and TV. Major technical challenges exist when successfully transmitting video and audio via the Internet and intranets. Currently, there is no one standard by which streaming players and servers can interoperate. Some new standards include the Real-Time Streaming Protocol is attempting to provide such interoperability. It is predicted to become a full standard in 1998. Browser and OS vendors may need to investigate G.723 audio and H.263 video to make sure the market for video and audio streaming remains open and robust.

Streaming video and audio products have been making a lot of noise on the Web and in the press. However, the performance of first-generation products, particularly over the Internet, has often fallen short of user expectations. Nevertheless, streaming media over Internet Protocol networks holds a great deal of promise because the Internet is emerging as a key information infrastructure for organizations and individuals, and because video and audio are natural media forms to which we have become accustomed through television, film and radio.

Successfully transmitting video and audio over the Internet, and even over private intranets, poses major technology challenges. Video images, which consume massive amounts of bandwidth, must contend with limited network throughput and with transport protocols that were not designed for continuous transmission. In a complex and disparate system such as a computer network, no single technological advance emerges as a panacea for streaming video. But advances in several key areas are now appearing that together will combine to significantly improve the quality and consistency of real-time media over IP networks.

The bandwidth pipe to the end user continues to expand. ISDN terminal adapters and 56-kbit modems are currently being shipped, technologies that afford a 60 percent speed increase over the existing V.34 standard. Cable and ADSL technologies, available on a limited basis today, are capable of delivering multi-megabit rates. However, the full benefit of ADSL and cable advances will be tempered by the need for infrastructure development on the part of telecommunications carriers and cable operators. Jupiter Communications, a research firm specializing in interactive communications, projects that even by 2000, more than 80 percent of home-based Internet users will use analog access methods. In corporate environments, users have access to higher bandwidth, but this is typically shared by many users and many applications.

The fundamental way to address bandwidth constraint is through compression. An uncompressed full-motion quarter-screen color video image consumes more than 70 Mbits/second, so a great deal of compression is required. There are a variety of compression technologies in use today for streaming video, based on discrete-cosine-transform schemes or on non-DCT approaches. DCT methods, including MPEG and H.263, transmit only the differences between consecutive video frames rather than all the data in every frame.

MPEG-1 and 2 were designed for CD-ROM and commercial broadcast delivery, respectively. They offer excellent clarity and motion representation, but they do not fare well at transmission speeds significantly less than 1 Mbit/s. H.263 was designed for modem-based videoconferencing and as a result performs much better at low-to-midrange speeds ranging from 28.8 kbits to half a megabit.

The primary non-DCT method in use today is wavelet compression, which has its roots in still images. Wavelets work by coding successive layers of resolution for each video frame, then playing them back at the highest level of resolution that the available bandwidth will allow.

The advantage of wavelets is that a single video file can play out over multiple bandwidths; the disadvantage is that wavelets are forced to transmit each individual frame in its entirety. This makes it difficult at low bandwidth to attain the frame rates necessary to convey motion.

As severe as the bandwidth constraints are, they are not as big a problem for streaming video as are the Internet's standard transport mechanisms and protocols. The Internet is a vast router network that exhibits tremendous variability in terms of throughput, congestion and end-to-end delay. Most network applications rely on the Transmission Control Protocol (TCP) to ensure reliable transmission of packets across the network. TCP addresses packet loss through retransmission, causing the familiar pauses followed by bursts of data. This is acceptable for text, which needs to be delivered error-free but not continuously.

However, TCP is inappropriate for video and audio media in which continuous playout is integral to comprehension, but where the error-free transmission of every pixel is not. Today's alternative is the User Datagram Protocol, or UDP. It does not retransmit lost packets with errors, and so provides a continuous playout. UDP is much better suited for streaming media.

Since most corporate firewalls today are not configured to pass inbound UDP, streaming products are evolving to intelligently switch over to TCP when the video stream needs to traverse a firewall.

To compensate for variations in throughput, even during a single connection, streaming products are also beginning to incorporate stream-rate adaptation capabilities. This technique varies the rate of the video/audio stream in response to network capacity, while utilizing a data buffer at the client end to deliver a constant media stream to the viewer.

Because UDP makes no attempt to recover lost packets, there is a need for specialized loss compensation and coding technologies-a variety of techniques designed to reconstruct the original video/audio signal even in the face of network loss. For example, Motorola's TrueStream software uses Dynamic Video Image Correction (DVIC) and Audio Loss Interpolation (ALI) to compensate for network packet loss. DVIC is a form of forward error correction in which a small amount of redundant data is sent, allowing the client decoder software to intelligently replace lost packets and significantly mask their absence. ALI is an audio interleaving method that spreads continuous sound bits out across a number of packets so that the loss of any single packet will not be significantly noticeable.

Other important coding technologies include pre- and post-filtering, and content-based coding. Pre-filtering simplifies an image by reducing the range of values for color and brightness, therefore making the image capable of being represented by a smaller set of data. Post-filtering conceals artifacts introduced by network impairments. An example of content-based coding is Motorola's Content-Sensitive Bandwidth Allocation, in which bandwidth is "borrowed" from low-motion portions of a clip and allocated to needier areas.

In addition to the many improvements being made in the underlying technology of streaming video, other changes are necessary in order to simplify the process for the user. Today most streaming products require a specialized browser plug-in or viewer application. Though such software is generally available free on the Internet, users are understandably reluctant to download and install software each time they encounter a new content format.

There is no standard by which streaming servers and players from different vendors can interoperate. The Real-Time Streaming Protocol, or RTSP, is an attempt to provide just that, much the way HTTP defines interoperability between Web browsers and servers. RTSP is currently in draft form before the Internet Engineering Task Force (IETF). It is likely to become a full IETF standard by mid-1998.

At the video and audio compression level, decoding capability must eventually be incorporated into major operating systems and browsers, or in the Java code that is shipped with these systems. The browser and

OS vendors will need to steer toward standards, such as H.263 video and G.723 audio, in order to ensure an open and robust market for video creation and transmission products.

Streaming video faces some tough challenges, and it may never be a substitute for the television in your den. But the streaming technology race is already under way and it's playing at a Web page near you.

Healthcare Informatics Online

By Polly Schneider

June 1998 - *Healthcare Informatics*

A Faster, Multimedia Internet?

CONVERGENCE IS ON the horizon. Where voice, data and images have previously traveled down different transportation channels it is now becoming possible to send all types of information across a single communications medium at a lower cost. CIOs are talking about multimedia email where physicians could dictate clinical notes or attach video clips of a patient's X-ray and send them on to a referring physician. Voice over IP and video over IP technologies are raising the possibility of interactive Web-based videoconferencing from home. In the not-too-distant future a patient cruising her HMO's Web site for disease advice could click on an icon establishing a phone connection with an advice nurse and ask questions through a PC microphone.

For rural doctors, making long distance phone calls to a referring hospital over the Internet could cut phone bills by more than half; Internet telephony is now being offered by major telecom firms across the country for dirt cheap rates of seven cents a minute. Networking companies are investing millions into the development of technologies that will support a multimedia world, and cable and telecom carriers are introducing high-speed Internet access in test markets across the country. This is encouraging for healthcare in its quest to create a multimedia patient record that providers can access in real time, from virtually any location.

Examples of how telehealth and Internet technologies could merge are beginning to unfold in small ways across the country. Cisco Systems and Acuson Corp. have been staging high-profile demonstrations of an

application for viewing ultrasound images remotely over the Internet. Using a Web browser, Acuson's WebPro package allows users to pull an entire exam over the Internet or an intranet from Acuson's ultrasound imaging system at the lab.

Telemedicine eyes the Internet

The DoD has several Internet-enabled telemedicine studies and projects under way. An Internet-based teledermatology system at the Walter Reed Army Medical Center in Washington, D.C., is in the process of rolling out to 11 hospitals and 41 clinics in the Army's 21-state North Atlantic region. Using an inhouse-developed system, primary care providers will be able to send encrypted patient histories and digital photos over the Internet to a database on the Walter Reed server. Walter Reed dermatologists can then log on to a password-protected Web site and review cases, zooming in on images for more detail.

The main advantages of using the Internet, says Lt. Col. Ronald Poropatich, telemedicine director at Walter Reed, are broader distribution capabilities and cost savings from sending text data and images in the same electronic file: previously, patient histories were faxed separately. Poropatich says there have been no major performance issues yet with using the Internet.

Strategic Monitoring Services, Inc. (SMS) is a New York City-based disease management firm that recently won a DoD contract to provide Internet-based medical records, outcomes and patient education for chronically-ill lung disease patients. SMS uses a combination of telemedicine, home care and the Internet to manage its patients. Clinicians dial into an intranet to retrieve daily assignments and multimedia patient records, and to file reports at the day's end, while patients are using Web TV to review disease and treatment information. "Truly interactive, data rich disease management is not yet there for the DoD or anyone else, but it is inching closer," says Gregory Muth, CEO of SMS.

Stanford Medical Center has been providing ISDN-based educational videoconferences to physicians at hospitals in Singapore and Manilla for several years and is now looking to pilot a Web-based program of prerecorded lectures and grand rounds to its Asia partners. Stanford has developed software for video streaming over the Internet to physicians through a secure Web site, according to James Bair, director of

international medical services at Stanford. "They'll be able to get very current medical information whenever they want."

Full speed ahead

The ticket to making telemedicine and telehealth viable over the Internet is finding more bandwidth. A heavily-promoted telecommunications service coming of age now is digital subscriber line, (commonly called DSL or xDSL) a broadband technology that uses the existing copper wire infrastructure to deliver transmission speeds of up to 8 Mbps downstream--much faster than ISDN at 128Kbps or a T-1 line at 1.5 Mbps and cheaper too. Cost estimates for DSL are ranging from $100 to $250 a month.

Unlike the circuit-switched technology ISDN lines use, DSL uses a dedicated, packet-switched connection found in frame relay, ATM or IP networks, according to Kieran Taylor, DSL product marketing manager at Bay Networks, Santa Clara, Calif.

"What makes DSL possible is it uses the same phone wiring of the network today but at a higher spectrum," Taylor explains. "It goes above the four kilohertz used for voice...and that's what enables the multi-megabit speeds." Bay Networks offers DSL products that can deliver symmetrical or asymmetrical configuration--such as 7 Mbps down to the user and 1 Mbps up to the network, or 2 Mbps in both directions. Cisco Systems and 3Com also offer DSL products, as well as a growing contingent of smaller companies.

Because DSL uses ordinary phone lines, it may be a viable option for rural telemedicine sites where ISDN or T1 is unavailable or unaffordable. But its future is tied closely with the phone companies, which are still deciding when and how to offer it, pending standardization issues between differing versions of the product and market demand. In the meantime, Taylor says that a DSL system can be installed within a medical campus to facilitate speedy links for sending radiology images or other large files between departments and facilities.

DSL is also hampered by its distance limitation: a "last-mile" transport, it only covers the distance between the customer and the local phone office, after which the connection can continue over the Internet or a private leased line. Isolated sites that are 20 to 30 miles from the nearest phone office will be out of luck.

Dr. William Goodall, director of telemedicine at Allina Health System in Minneapolis, says DSL could provide the bandwidth to make interactive video more viable, but he is skeptical for now because of the distance limitations. Allina has a largely rural telemedicine network connecting 28 sites in Minnesota and Wisconsin, using dedicated T1 lines and VTEL equipment. In the near term, Goodall believes a new frame relay T1 service offered by US West will allow the network to conduct high quality, uninterrupted video consultations.

Bill Montgomery, CIO at Fletcher Allen Health Care in Burlington, Vt., says DSL could be a boon for his organization's statewide telemedicine network, "as soon as it's stable and reliable and the cost is reasonable." He says costs need to be closer to common Internet access charges of $20 to $30 month. Much of the problem, he says, is that the ISPs and the telecommunications firms do not have the market demand yet to support newer technologies. "Internet providers are struggling just to provide Web browsers and email."

Another high speed networking technology available in a few markets is two-way cable modem, which purports to connect users to the Internet at speeds of up to 10 Mbps through the existing cable infrastructure. It is largely being delivered to an estimated 100,000 homes for around $30 to $40 a month, but according to Taylor, the technology could also be used in healthcare.

On the application side, real-time Internet-based video is becoming a reality. Fletcher Allen and the University of Vermont's College of Medicine soon will begin to deploy PC video workstations to physician offices in Vermont and rural upper state New York, connected over an intranet to servers at Fletcher Allen Medical Center. The vendors under consideration are Intel, Zydacron and PictureTel. Montgomery's goal is to equip 600 offices with the technology to support videoconferencing, distance learning and other consultations. "The communications links with the doctors in our communities is the best way to help manage quality and outcomes," he says.

The technology that will allow Fletcher Allen to do this is called IP multicasting, a networking protocol that broadcasts one video file through a network and allows multiple subscribers to tune in using the same bandwidth. Multicasting saves bandwidth by replicating video packets to each subscriber only at the last minute, according to Kevin

Dickson, marketing manager for Cisco's IOS networking software. Also important, he says, is the ability to assign priority to packets during the transmission so that the video does not break up--a feature in Cisco's products.

Montgomery envisions multicasting will allow clinicians to tune in to live interactive education with video in one window of the screen, course materials in another, and a microphone and camera for asking questions during the session. Running such a course over ISDN lines would be cost-prohibitive for more than two or three people, he says. "That technology (ISDN) is going to be a good standard for quite a long time but it's not the way most people will be moving in the next five years."

Still, Montgomery admits that most Internet video applications are nothing more than toys, and the industry is still working on standards for sending video over an IP network. "We need the performance to be like getting 30 complex Web pages per second," he says. Using an ATM backbone from Cisco that guarantees bandwidth availability, he is hoping to achieve 21 to 25 frames per second on video transmission.

As Fletcher Allen moves to a capitated payment system that will make telehealth more economically viable, Montgomery sees an opportunity to solve the twin problem of overuse of resources by doctors and patients who don't have enough knowledge, and underuse, if a patient can't or won't travel for treatment. "We expect to gain market share and reduce our utilization." If Internet technology can be used, it will be more cost-effective and ubiquitous too.

According to Taylor, the latest predictions point to mid-1999 for widespread availability of an infrastructure that could effectively support Internet-based telemedicine. Security concerns will likely bar adoption of this model until much later, however. Goodall does not see the integration of telemedicine and the Internet in Allina in the foreseeable future, even with the increasing availability of industrial-strength encryption and other security tools. "The more secure you make it, the more difficult it is to access," he observes. While Montgomery also adopts a cautious approach to untested developments like DSL, he's optimistic about the potential impact of the Internet on healthcare: "It's no different than the telephone at the turn of the century."

Polly Schneider is senior editor at Healthcare Informatics.

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Title: Live Transmission of Ultrasound Exam - Featuring Former Chicago Bear Tom Waddle - Reaches More Than 26,000 Healthcare Professionals at RSNA.

Date: 11/30/1998; **Publication**: PR Newswire;

Cisco Systems, Optivision and Ameritech Demonstrate With Ultrasound Technology

Leader Acuson the Future Delivery of the 175,000 Ultrasound Exams Performed

Each Day in the United States

CHICAGO, Nov. 30 /PRNewswire/ -- A live ultrasound exam, demonstrating the latest advances in ultrasound and leading telecommunications technology, will be sent over fiber optic lines from Loyola University Health System (LUHS) in Maywood, Ill., to the Radiological Society of North America (RSNA) meeting at McCormick Place in Chicago, November 30, 12:00 - 12:30 p.m. The demonstration, featuring former Chicago Bear wide receiver, sports talk radio co-host and National Football League (NFL) television analyst Tom Waddle, will illustrate the advances in Acuson Corporation's (NYSE: ACN) high-resolution ultrasound technology for the diagnosis of sports injuries, such as those Waddle sustained during his NFL career.

Viewers of this telediagnostic transmission, conducted by Acuson and telecommunications leaders, Cisco Systems, Optivision and Ameritech, will be able to observe Waddle's musculoskeletal structure (his knee, shoulder, and elbow) live during his ultrasound exam at Loyola. By combining telecommunications and ultrasound technology, this transmission will show how telediagnosis could be used to link medical experts anywhere in the country -- from a sports clinic to an orthopedic surgeon's office, or from a rural clinic to a primary care center.

"The advent of telediagnosis has allowed the radiology lab to come to the physician, delivering high quality diagnostic images, saving time, improving patient care and ultimately reducing costs for patients and hospitals," said Ian Cappe, MD, M.B., B.S., F.R.A.C.R., radiologist, North Coast Radiology, Lismore, Australia, and a recognized expert in muscoloskeletal ultrasound.

"With Acuson's high-resolution imaging technology, ultrasound can now provide more patient benefits outside of its conventional uses, like cardiology and fetal imaging, and it can be used to image soft tissue injuries such as tears and strains that are common sports medicine injuries."

The live demonstration will shoe real-time (30-frames-per-sec) ultrasound images transmitted from an Acuson Sequoia(R) ultrasound system at LUHS to the Acuson booth at McCormick Place. This real-time ultrasound exam is made possible through the use of Optivision's LiveSystem(TM) video networking technology and DS-3 (45 megabit-per-sec bandwidth) asynchronus transfer mode connection provided by Ameritech. This digital demonstration represents the highest diagnostic quality component video and CD quality audio available today.

"Optivision is pleased to provide the high quality video results that are critical to the medical field," said Mike Galli, director of marketing at Optivision. "The LiveSystem delivers high quality video suitable for medical images at lower bandwidths than prior systems. Optivision is happy to be teaming with Acuson and Cisco in such a significant demonstration of networking images for the medical community."

"As ultrasound turns 50 this year, Acuson continues to be a pioneer in the development of leading-edge ultrasound technology, now providing the ability to link physicians from across the world using the Internet and digital imaging solutions," said Daniel R. Dugan, president for Acuson Corporation. "Linking the growing field of ultrasound with state-of-the-art telecommunications from Cisco Systems, Optivision and Ameritech, allows clinicians to view real-time ultrasound images remotely, providing yet another way to

improve patient care into the next century. Along with our telecommunications partners, Acuson is committed to improving the delivery of diagnostic ultrasound exams, in addition to reaching into new areas of medicine, such as imaging areas of the body treated by the growing field of sports medicine."

"The Internet is changing the way people access health care information, and one of the more exciting applications is telediagnosis," said Kathryn McTighe, manager of the Global Health Care Market Development at Cisco. "By combining Cisco's network infrastructure and Acuson's technology, we can demonstrate how the Internet can provide health care professionals with the ability to view high-resolution images and give expert diagnoses on-line, 24 hours per day, in any location."

In addition to the Tom Waddle/sports medicine exam on Novemer 30, Acuson, Cisco Systems, Optivision and Ameritech will also transmit obstetric and abdominal ultrasound exams, using Native(TM) Tissue Harmonic Imaging technology and MICROSON(TM) high-resolution imaging, throughout the RSNA meeting.

Acuson Corporation is a leading worldwide manufacturer and service provider of medical diagnostic ultrasound systems and image management products. The company's products are used by hospitals, clinics and healthcare delivery systems throughout the world. Located in Mountain View, Calif., Acuson had sales of $438 million in 1997. Educational, product and corporate information is available on Acuson's Web site at http://www.ultrasound.com or www.acuson.com.

Optivision, Inc. develops, manufactures, and delivers MPEG (Motion Picture Experts Group) network video products for high-quality digital video creation, management and distribution worldwide both directly and through leading industry partners. Optivision's products target commercial and professional markets and are used in diverse applications such as video courier services, video conferencing, telemedicine, video surveillance and distance learning. The company was founded in 1983 and is headquartered in Palo Alto, Calif. Optivision news and product information are available on the World Wide Web site at http://www.optivision.com, or phone 800-562-8934 or 650-855-0200.

Cisco Systems, Inc. (Nasdaq: CSCO) is the world wide leader in the networking for the Internet. Cisco products include routers, LAN and ATM switches, dial-up access servers and network management software. These products, integrated by the Cisco IOS software, link geographically dispersed LANs, WANs and IBM networks. Cisco Systems news and product/service information are available on the World Wide Web site at http://www.cisco.com. Cisco Systems is headquartered in San Jose, Calif.

Ameritech (NYSE: AIT) serves millions of customers in 50 states and 40 countries. Ameritech provides a full range of communications services, including local and long distance telephone and data, cellular, paging, security services, cable TV, Internet and more. One of the world's 100 largest companies, Ameritech (www.ameritech.com) has 71,000 employees, one million shareowners and nearly $29 billion in assets.

Loyola University Health System is a wholly owned subsidiary of Loyola University Chicago. The system includes Loyola University Medical Center in Marywood, Ill.; 18 primary and specialty care centers in Chicago's western suburbs; a partnership with the Rehabilitation Institute of Chicago; and joint ownership and operation of RML Specialty Hospital, a long-term acute care facility.

Background Information:

Breakthrough Ultrasound Technology

MICROSON(TM) high resolution imaging is achieved through Acuson's technological innovations combined with a new family of high-resolution transducers, resulting in the ability to clearly visualize extremely small anatomical structures such as the individual nerve bundles within the median nerve in the wrist.

Acuson's Native(TM) Tissue Harmonic Imaging takes advantage of Acuson's ultrasound systems' sensitivity to apply second harmonic imaging techniques to the body's tissue. Accounting for 20 to 30 percent of patients examined with ultrasound, the difficult-to-image patient class includes people who are overweight, those who smoke, the elderly, people who are very muscular, or who have narrow rib spaces and a thick body wall. Historically, it has been challenging or impossible for physicians to make a definitive diagnosis on such patients without resorting to more expensive and invasive exams.

Ultrasound History

Adapted from SONAR technology in 1948 for medical use, ultrasound has become the second most widely used diagnostic procedure in medicine after X-ray. Ultrasound's most common uses include abdominal abnormalities, sports injuries as well as heart, breast and prostate disease, pregnancy and gynecological imaging.

To celebrate the 50th anniversary of ultrasound, Acuson has developed the "Sound Medicine" brochure to highlight these benefits. The brochure carries the American Academy of Family Physicians Health Education Program Seal of Approval.

Title: Providers Show Some Backbone.(issues are expansion of bandwidth,)(local computer networks, security)(Brief Article)(Industry Overview)

Date: 3/1/2000; **Publication**: Health Data Management; **Author**: Gillespie, Greg

While the Internet is still a risky proposition, some telemedicine providers are using it as their network backbone. Will others follow?

Telemedicine offers health care some of the best examples of using networking technology to better serve patients. Few visions are more compelling than physicians using real-time, interactive video to provide consultations, make diagnoses and even lend assistance during surgeries.

This vision is a reality for many health care organizations providing telemedicine services. These integrated delivery systems and hospitals use dedicated, point-to-point, proprietary networks to offer interactive telemedical services and transmit large, digitized image files in seconds. But these telemedicine programs are limited in scope because dedicated network connections are expensive, particularly for small or rural hospitals and clinics, where telemedical services often are needed most.

The Internet, however, is changing the way telemedicine is provided. Some telemedicine programs are beginning to use the worldwide network of computer networks as the backbone for telemedicine. And many industry observers believe that eventually the Internet will become the backbone of choice for most telemedicine programs because it enables low-cost, ubiquitous connectivity.

This opinion is based in part on the Internet's rapidly increasing bandwidth--the transmission capacity of Internet connections. Also fueling the opinion is industry faith in two well-funded research projects--combining government agencies, universities and private companies--developing new technologies to improve the quality and speed of Internet connections.

When?

For many CIOs and telemedicine program leaders, the question becomes: When will the clear majority of telemedicine executives' concerns about the Internet finally be allayed, thus making the public network an easy choice?

Telemedicine providers and other experts say the Internet as it is today has technical limitations and security issues that limit its effectiveness as a network backbone for many telemedicine programs. A lack of bandwidth and inadequate quality of network service, for example, make it difficult to run live video and audio feeds, or even move large image files across the Internet in a timely fashion.

And when it comes to security, the refrain is common though not entirely legitimate: Many physicians and patients doubt that any security measures can guarantee the privacy of data moving across the public Internet.

Regardless of the hurdles, the telemedicine industry realizes the writing is on the wall, says Jay Sanders, M.D., adjunct professor of medicine at Baltimore-based Johns Hopkins School of Medicine and president and CEO of the Global Telemedicine Project, a telemedicine consulting firm also based in Baltimore.

"There are fundamental problems with using the Internet. However, many telemedicine providers believe the inescapable reality is that the Internet will evolve, meet the needs of the market, and become the network of choice," Sanders says.

Two of the biggest issues are transmission speed and quality of service. The Internet often is too slow and unreliable for many telemedicine services, such as interactive video consultations. A lack of bandwidth

creates bottlenecks in the Internet that slow data transfers. Bandwidth is the quantity of data that can be transmitted in a fixed amount of time, usually represented in bits or bytes per second.

As a result of insufficient bandwidth, video and audio transmissions do not flow smoothly and uninterrupted across the Internet. In addition, large image files can take hours to travel across the Internet, an unacceptable delay if a physician has to render assistance based on that image in an emergency situation.

Store and forward

Most telemedicine programs using the Internet today avoid these problems by operating store-and-forward telemedicine systems. These systems enable physicians to transmit via the Internet text, audio and video clips, and digital images that are not time-sensitive, typically as e-mail attachments. This has greatly increased the ability of physicians to provide some services to remote or underserved areas. But store-and-forward does not enable physicians to provide real-time services, such as interactive video teleconsultations. And that's a major drawback.

To overcome hurdles of transmission speed and quality of service, though, telemedicine providers won't have to travel far. The majority of transmission problems occur during the "last mile" of a connection, says John Gilbertson, adjunct assistant professor of pathology at the University of Pittsburgh Medical Center, Pittsburgh. The medical center is the lead organization for the Internet-based UPMC Telepathology Consortium.

The "last mile" refers to the line that links a PC or workstation to the Internet, or to the line that links a PC or workstation to a local or wide area network that then links to the Internet. These connections--often a dial-up modem or an Integrated Services Digital Network line--typically are too slow to deliver large image files and live video and audio feeds to the desktop in real time. In other words, it's not the backbone of the Internet that's the problem, it's the health care organization's link to the Internet.

The University of Pittsburgh Medical Center uses the Internet for a store-and-forward program that links its pathologists to physicians in the United States and Europe.

The pathologists in the program typically work out of their homes and are connected to the Internet via ISDN lines. ISDN connections can transmit data at 128 kilobits per second, much faster than the more common 56 kilobits or 28.8 kilobits per second dial-up modem connections.

But ISDN connections cannot quickly transmit large image files, which can be hundreds of megabytes in size. In addition, if traffic on the local section of the Internet is heavy, digital image files can be delayed, sometimes for hours.

"There always is an issue with time delays--but we're using a public network, and we take what we can get," Gilbertson says. "The network is reliable in the sense that images get from one place to another--we wouldn't do it otherwise. But I don't see any use for interactive services, such as telesurgery, until there's widespread deployment of high-bandwidth connections between computers and the Internet."

Eliminating the "last mile" problem would eliminate many of the transmission delays facing telemedicine providers today. But even with ample bandwidth, the Internet still does not always provide the quality of service necessary for video and audio to be transmitted in a timely fashion. Quality of service, a term coined by the telecommunications industry, refers to the performance of a network measured by the number of data packets lost or "dropped" during transmission.

The quality of service of telephone calls, for example, is typically almost 100%, meaning few if any data packets are lost during voice transmissions. The Internet has not yet matched the quality of service of voice

networks. As a result, live video and audio feeds, as well as digital images, cannot be transmitted with the same degree of assurance.

The University of Virginia Office of Telemedicine is an example of the potential and the problems of using the Internet for telemedicine.

The university, along with two hospitals and two clinics participating in its telemedicine program, is linked to a statewide high-speed wide area network that uses the Internet as its backbone. The network, called Net. Work Virginia, uses asynchronous transfer mode switching technology to link state institutions and private hospitals over the wide area network.

Backbones

ATM and other transmission technologies often are referred to as "backbone" technologies for networks. ATM--as well as Ethernet, Token Ring and fiber distributed data interface, or FDDI--are technologies that specify how data will be transmitted over the cables and wires that make up a network.

The two hospitals and two clinics participating in teleradiology, teleconsultations and educational programs via the network have high-speed T-1 connections to the ATM backbone. These T-1 connections, combined with the high-speed ATM backbone, give the organizations enough bandwidth for the "last mile" of the connection to successfully receive transmissions in real time.

But even with these high-band-width connections, the University of Virginia still has problems with the quality of service, says Eugene Sullivan, director of the office of telemedicine. This delay or loss of packets of data can cause interruptions in video and audio feeds, as well as digital images being transmitted to specialists.

"While these high-speed connections have given us the ability to do incredible things with telemedicine, this is not the way to build a road to the future," Sullivan says. "Extending our real-time video services to more remote sites is too expensive, and even with high-speed connections, the quality of service is not always perfect."

Real-time sessions

As part of the telemedicine program, specialists use workstations at the University of Virginia Health Sciences Center, Charlottesville, to link via the Internet and Net. Work Virginia to patients at the two hospitals and two clinics. Conducting the real-time interactive video session, specialists use the delivery system's multimedia patient record to review encounter information while connected to one of the remote sites.

Nurses who sit through the teleconsultations can take clinical readings during the patient encounter, or transmit images, such as X-rays, per the specialist's request. By moving a video camera attached to the remote PC, specialists can watch while patients walk across the room or try to lift their arms above their head, for example.

While programs like the University of Virginia Office of Telemedicine do their best to use the Internet and overcome its current hurdles, other telemedicine providers and industry groups also are working to fix the technical limitations of the Internet. What might be harder to overcome, however, is the perception of the Internet as an unsecure network backbone, says Gilbertson of the University of Pittsburgh Medical Center.

Security tools

As part of the Telepathology Consortium, the university, for example, uses a host of security measures. Transmissions are encrypted using secure sockets layer encryption technology. Each client computer or workstation sending or receiving a transmission has to have a digital certificate for identification. In addition, servers and databases used for the telemedicine program reside behind firewalls designed to prevent unwarranted access.

Even with all these security measures, though, some physicians and patients aren't convinced that the telemedicine system that relies on the Internet for its network backbone is secure, Gilbertson says.

"We feel that the security technologies are more than adequate. But still, you're always hearing about someone breaking into a database and stealing information," Gilbertson says. "You have to contend with that perception."

As a result, using the Internet as a backbone gives birth to security concerns, experts say. These security concerns are "90% perception and 10% reality," says Sanders of the Global Telemedicine Project. But they must be addressed before physicians and patients will be comfortable with the idea of transmitting health data across the Internet, he adds.

"The privacy and confidentiality concerns are real and need to be addressed because technical people have to be prodded to design systems with the absolute highest degree of security," Sanders says. "Conversely, everyone has to be aware that a totally secure system simply does not exist--hackers can get into any system using the Internet. So, the intent has to be to make Internet-based telemedicine systems exceedingly difficult to get into."

More effective security measures, many experts believe, will be developed hand-in-hand with overall improvements in the Internet's speed and efficiency. Transmission protocols and other new Internet technologies have the potential to improve speed and efficiency as well as the security of data transmission.

Two research projects are focusing their efforts on upgrading the Internet's performance and security with new and refined protocols.

The Internet2 and Next Generation Internet projects both plan to increase the speed and efficiency of the Internet with advanced technologies that will enable network connectivity at speeds of 100 to 1,000 times faster than today's Internet. In addition, researchers on the projects are using private testbeds to develop other enhancements to improve the Internet's efficiency and dependability.

Though its commercial popularity has exploded in the last five years, the Internet and its data transmission protocols have been around for decades. As a result, those technologies are becoming outdated, says Greg Wood, a spokesman for the Internet2 project, whose Web site is at www.internet2.edu.

"Applications that enable people to collaborate using streaming video simply weren't envisioned 20 years ago, and the technology of the Internet doesn't support it," Wood says. "We've seen incredible increases in bandwidth over the past five years, but we haven't seen a corresponding increase in reliability and efficiency of the network. Existing protocols might do wonders for Web sites and e-mail, but telemedicine is a different story altogether."

The Internet2 project, which includes more than 170 universities and 30 corporate sponsors, is run by the University Corporation for Advanced Internet Development, a not-for-profit oversight company. The Next Generation Internet was launched in 1996 by the Clinton Administration, which pledged $100 million annually for three years to support its research. The Next Generation Internet's Web site is located at www.ngi.gov.

Banking on the future

Many telemedicine providers are banking on these projects to come up with the solutions to the speed and performance problems that have so far kept most telemedicine programs from using the Internet as a network backbone.

And the Clinton administration also is making telemedicine a priority. Its proposed fiscal 2001 budget includes requests for funding the development of high-speed, Internet-based wireless networks to bring telemedicine and educational programs to rural areas.

But others think that market forces will bring about the same results: Consumers are demanding interactive services, and another industry--such as entertainment--hunting for revenue will be the first to deliver them.

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THE WALL STREET TRANSCRIPT
Questioning Market Leaders For Long Term Investors

IntraCom Corporation

COMPANY INTERVIEW: JAMES NATIONS

JAMES NATIONS is the President of IntraCom. Mr. Nations has over 20 years of experience in senior business management, marketing, and law. Prior to becoming an IntraCom employee, Mr. Nations was IntraCom's FDA regulatory consultant. He was a Founder, Officer and Director of Sciton, Inc., a Palo Alto, CA, medical laser startup, from 1997 to 1998. Mr. Nations was Director of Market Development for the medical division of Coherent, Inc. (NASDQ: COHR), Santa Clara, CA, from 1996 through 1998. He was Executive Vice President of Ecology Control Industries, Los Angeles, CA, an environmental remediation company, from 1994 to 1996. Mr. Nations was Founder and CEO of Ultrans, Inc., a hazardous materials transportation company, from 1987 to 1994, and Legal Counsel and Board Member of Lodestar Research, a leading fusion research company to the US Dept. of Energy, from 1986 to 1993. From 1982 through 1987, Mr. Nations was an attorney at O'Connor & Hannan in Denver, CO, specializing in securities and complex business litigation. Mr. Nations received his BA from the University of California at Berkeley, his JD from Berkeley's Boalt Hall School of Law and conducted graduate business studies at Berkeley's Haas School of Business.

SECTOR – MEDICAL DEVICES

(JAP601) (14397) TWST: Give us a brief historical background and current summary of IntraCom.

Mr. Nations: It is incredible to realize that IntraCom started less than four years ago in California with only a sketch of an idea. Yet here we are on February 17, 2000 — giving a presentation at Warburg Dillon Read's Global Healthcare Services Conference in New York and announcing the engineering release of our lead product MedEcho, which transmits ultrasound images live over the Internet.

IntraCom started in late 1996, with the basic idea for the company sparked by a cardiologist who expressed his frustration with the state of ultrasound technology. The physician frequently had to be on-call for emergency situations at a San Francisco-area hospital, and he did a lot of his diagnosis using ultrasound. Often, he would get called-in during the evenings and have to drive 25 miles to the hospital. He thought clinical service would be enhanced if he could view ultrasound studies from his home.

We took on the challenge, and three years later came up with the MedEcho system that allows ultrasound images to be sent over the Internet live, so that a physician can actually perform a study from any location that has an Internet connection. That is the genesis of IntraCom.

Our thrust now is to develop a suite of clinical services, Internet-based clinical service applications that bring value to physicians in their clinical practices.

MedEcho is our lead product, and we have received clearance from the FDA to market it in the US. We're here in New York to announce the engineering release of MedEcho and two other products, which are MedScribe, which is an automated Internet-based transcription system, and MedSearch, which is a graphically represented search engine for the medical profession.

TWST: Can you give us a few examples of past MedEcho demonstrations?

Mr. Nations: In May of 1999, we did the first coast-to-coast live transmission of an ultrasound exam through the Internet from Sunnyvale, California, to physicians at Walter Reed Hospital in Washington, DC. Then in September of 1999 we did the first trans-Atlantic transmission of a live ultrasound over the Internet from St. Petersburg, Russia, to Bethesda, Maryland and Sacramento, California. That was in conjunction with the Heart to Heart Foundation, a nonprofit organization that does volunteer work in Russia.

TWST: Can you give us just a few highlights of the presentation you gave today at the Plaza Hotel?

Mr. Nations: We presented our core concept on becoming a one-stop e-destination for physicians and other medical professionals. We articulated our market position as a clinical service provider. We aim to do this by offering a suite of clinical service products through a single interface called MedDesk. MedDesk is essentially a browser that sits on a physician's desktop, and works as a framework for all of these clinical tools. So today we introduced to the group here the MedDesk gateway and showed them a working version of MedEcho. We also described the attributes and markets for each of our products. For example, there are about 38 million ultrasound exams done in the United States every year. There is about $6.7 billion spent on medical transcription in the United States, and we think that the market for our medical search engine is about 100 million searches a year. So we outlined our marketing and sales strategies for attendees, and then showed them a demonstration of the MedEcho medical product.

TWST: What do you see as the marketing and distribution system for these products, and what partnerships or alliances do you feel are important or critical to success in that area?

Mr. Nations: We're here in part to secure a $20 million private financing round. Part of those proceeds will go toward assembling our sales organization. We're partnering up with Innovex, a Quintiles company, which will augment our sales group. About eight weeks after the date of closing of this private round, we'll put a 50-person direct sales force on the street, targeting cardiology specialists. That will be our first rollout. Then we're also partnering up with Convergent Communications to help us with our pre and post sales and technical support. For connectivity, we're partnering up with MCI-WorldCom and @Work-AT&T, to help with the development of our high speed Internet connectivity. We're also working on partnerships with Cisco, Oracle, Hewlett-Packard, Microsoft and Intel for our hardware and software systems integration.

Highlights

IntraCom is a clinical service provider (CSP) that is developing a suite of Internet-based clinical service applications that bring value to physicians in their practices. Its lead product is MedEcho, a system that allows ultrasound images to be sent over the Internet live, so that a doctor can actually perform a study from any location that has an Internet connection. President James Nations says IntraCom is becoming a one-stop e-destination for health professionals. The company has articulated its market position as a CSP by offering its suite of clinical services through a single interface called MedDesk, which is basically a browser that works as a framework for all of the various clinical tools. The current plan for the company is to raise $20 million over the next eight to 10 weeks and hopefully follow up with an IPO later in the year. Upon completion of the financings, he hopes the company will be in a very strong position to execute the business plan.

TWST: Obviously, when you deal in any area of healthcare today you have to look at the cost-side of the equation from the consumer, and from the medical providers point of view. How do those items fit in with current alternatives, and how does the value-add of your product and service today affect that equation?

Mr. Nations: Basically, what happens right now is that in outlying clinics, if the ultrasound exam is done by a technician, then the patient is typically referred back to a regional hospital or a teaching hospital for another examination. That's very costly, and obviously very hard on the patient. In addition to that, the referring physician then loses the revenue stream associated with that patient as they move up the healthcare system. With MedEcho, what they're able to do is to connect with an expert physician, and share the images with him or her, and thus remove the need for moving the patient. In the case of pediatric cardiology, where the child's life may hang in the balance, IntraCom's new technology is going to be an important step forward.

"We presented our core concept on becoming a one-stop e-destination for physicians and other medical professionals. We articulated our market position as a clinical service provider. We aim to do this by offering a suite of clinical service products through a single interface called MedDesk. MedDesk is essentially a browser that sits on a physician's desktop, and works as a framework for all of these clinical tools."

TWST: When you look at IntraCom's management team, do you feel that you have on board the right set of skills? Are there areas that you're looking at for changes or additions?

Mr. Nations: We think that we've a very strong management team. We've got broad business experience and domain specific relevance, especially in the areas of software design, medical equipment manufacturing, FDA regulation, medical sales and sales management, public company financial reporting, ISO quality management, and e-commerce marketing.

TWST: You mentioned that you are looking to raise additional capital. As you look ahead, a year or two out, are there inflection points ahead where capital investment will still be items under review?

Mr. Nations: These are always items under review. Our present plan is to raise $20 million in this private round, which we hope to close in the next eight to 10 weeks. Then we will follow up with our initial public offering later this year, probably in the third quarter. Upon completion of these financings, we will be in a very strong position to execute our business plan.

TWST: Usually at this point, I talk about the investment community's understanding of the company. I still think it's pertinent, even though IntraCom is not out there yet. What do you think, as an investor approaches the company, will be the misperception or the misconceptions about your business or to your business market niche?

Mr. Nations: We are in Internet healthcare space, and there has been much publicity about the 1,000-pound gorilla, Healtheon/WebMD out there, particularly after their mergers in the last few days. IntraCom is different. We are classifying and positioning the firm as a Clinical Service Provider or CSP. This is a term we coined to describe our focus on the practice of medicine and providing those essential lifesaving tools needed in the art and science of medicine.

It's that vertical focus that we have, as opposed to the broad horizontal focus of Healtheon. So I think that's an important distinction.

Another is our business model, which converts us from what has traditionally been a capital equipment-type company. We're turned that model on its head to make us, again, a Clinical Service Provider. This allows us to offer services with low-cost subscription and user-based fees. So instead of looking at, say, a $65,000 capital equipment purchase, and going through those long capital equipment purchase cycles, we're able to offer a menu of services at very low barriers to entry — essentially no barriers of entry. Healthcare specialists can subscribe to our basic services for about $750 a month. That, coupled with IntraCom's easy-to-use interface system, essentially eliminates the traditional barriers that one commonly experiences in the medical field.

"We are in Internet healthcare space, and there has been much publicity about the 1,000-pound gorilla, Healtheon/WebMD out there, particularly after their mergers in the last few days. IntraCom is different. We are classifying and positioning the firm as a Clinical Service Provider, or CSP."

TWST: After technology is accepted there is always a move towards integration, an effort to reduce the number of appliances on the desktop or the number of tools in a physician's tool kit. What do you see as the integration possibilities or the necessities as you look over the next two, three, four years? Obviously that's a little outside of the immediate problem of getting these products into the marketplace. But yet, as you sell them, and you sell the services, people are looking at how many items will I have to have in my little armamentarium here today, and how can I reduce or manage that list of tools?

Mr. Nations: The nice piece of this is that MedDesk is a framework that allows us to bring in any of the clinical functionalities that a physician may want in one place. Our first target for MedDesk has been the ultrasound imaging piece. Other pieces you could expect to see from us would be in other imaging modalities, both still-image and other medical motion imaging. I've already mentioned the e-scribe piece of it. Then, as a follow-on, we will provide continuing medical education courses to physicians, especially courses that incorporate sophisticated imaging capabilities that aren't found on the Net right now. We can also develop other patient monitoring services such as halter monitoring and EKGs. Those are the sort of services I see IntraCom offering in the future. We really see our role as the integrator of clinical solutions for the physician. Whether developed by IntraCom or acquired through acquisition, or partnering and affiliation relationships, MedDesk will be the only tool they need.

TWST: What is the vision? When you look long-term — and with lifecycles today, I'm not sure whether that's three years, five years, or 10 years out — what's the vision when you look at IntraCom's future?

Mr. Nations: We will be hitting vertical markets, vertical specialty market across the medical practice that focus on critical clinical applications. So whethe that be patient monitoring, image transmission, laboratory analysis, or othe important clinical services that a physician needs and that can be sent over th Internet, that's where we really see our future. Five years from now, we envisio a truly globally connected medical community where physicians can consult with and assist one another, regardless of geographic location or political boundaries Ten years from now, I would like to think IntraCom had played a significant rol in allowing physicians worldwide to achieve universal healthcare.

TWST: When I look at what you're talking about today, I see the ability for learning opportunities for many, many different medical examinations, perhaps in real-time for consultative purposes and thinking exercises. What role will the training element play?

Mr. Nations: I think that's important, not only as a traditional training element, which I think is certainly there, but in a more interactive training element, where you can do real-time, real event training. With ultrasound, for example, you can have a trained stenographer and a physician, and often what happens is that when the exam gets taken and transferred to the physician, it's not what he wants to see. Now, with a device like MedEcho, the physician can perform the study in real-time and actually mentor the technician in exactly the regime he would like to see for these particular procedures. So it really is a real-time teaching tool.

The term that is being used for this is "telementoring" because what happens is that there's a two-way transfer of knowledge. A doctor or the technician out in the rural areas can consult with the so-called "expert" in an urban teaching hospital. Not only do they gain confidence about the decision that they're making today, but next time they see that condition, they probably don't need to consult because they've already learned how to recognize it and how to respond to it.

This really goes toward the goal of most healthcare service providers: improving access for people in remote areas, improving the quality of care in those areas, and reducing the cost of that care.

TWST: A summary statement then today, and direct it at the investment community. What would be the short list of strengths and highlights that you feel, in summary, compel an investor today to buy into IntraCom Corporation?

Mr. Nations: We're a highly focused company. Again, in the vertical market of clinical applications, capitalizing on the merging of medical clinical technologies and the Internet. MedDesk will offer a suite of these applications. There's a huge pent-up demand for our services, such as moving ultrasound images the MedEcho way. There just hasn't been the technology available to do it until recently. There is fertile ground for Internet-based Clinical Service Providers. We defined this space and are in excellent position to capitalize on it for the benefit of physicians, patients, and our shareholders.

TWST: Thank you.

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Heart to Heart

A Biannual publication of Heart to Heart International Children's Medical Alliance ▪ Volume I, Issue 3 ▪ Winter 1999

Heart to Heart Completes 17th Humanitarian Aid Mission to St. Petersburg, Russia

Surgical Resident Brian Cain, Drs. Nilas Young & Pate Thomson with Russian patient, 2 days after off-pump coronary bypass surgery.

In September 1999, Heart to Heart conducted its fifth medical humanitarian aid mission in support of the Adult Cardiac Care Program in St. Petersburg, Russia.

Nineteen Heart to Heart medical volunteers donated their time and expertise to provide humanitarian aid at the City Cardiosurgery Center at Adult Hospital Number 2 under the able leadership of Professor Zorin, the city's Chief Cardiac Surgeon and Director of the Cardiosurgery Center.

Working side-by-side with Russian colleagues, Heart to Heart medical volunteers from the San Francisco Bay Area's Alta Bates and Summit Medical Centers and guest colleagues from Northern California and Brigham and Women's Hospital in Boston conducted over 150 patient exams, 13 catheterization laboratory procedures, and 12 open heart surgeries on some of the most difficult adult cardiac cases in St. Petersburg. Over half a million dollars worth of desperately needed medical supplies were hand-carried by Heart to Heart delegates and given directly to the medical personnel at the Cardiosurgery Center. This cooperative effort yielded excellent results: 12 adults successfully underwent highly complex open-heart surgeries, and the quality of life for 13 persons was significantly enhanced through catheter interventions. Each patient treatment was made use of as a teaching opportunity. The overall program value reached nearly $1 million—significantly exceeding our own goals!

Trip participants (from left): Kent Dauterman MD, Marty Castell, Lisa Tisdale, Rene Ovalle, Glen Petersen MD, Owenita Escalada, Brian Cain, Duane Stephens MD, Lanette Vallero, Elaine Shea, Juan Warren, Robert Gwynn MD, Jeanette Pletcher, James Calonge. Not shown: Sary Aranki MD, Jennifer Castner, Valerie Claypoole, Josie Barry-Everett, Igor Plotkin MD, Judy Thomson, Pate Thomson MD, Nilas Young.

Educational and Training Highlight: Off-Pump Coronary Bypass Surgery

The main focus of the mission was to demonstrate a newly pioneered technique that circumvents the use of a heart-lung machine during open-heart surgery. Performing the coronary bypass procedure without the use of a heart-lung machine results in fewer complications and significantly reduces the costs normally

continued on page 4

Warehouse Operations Find a Home

After a year on the move, the Heart to Heart warehouse has found a home. The 8000 square foot warehouse, located on 98th Avenue in Oakland, is used to store donated medical supplies and equipment. As part of our Warehouse Operations, Heart to Heart ships donations of medical equipment and supplies to needy facilities around the world.

This latest move would not have been possible without the hard work and excellent advice of Scott Snyder of Desco Medical, as well as our warehouse assistant, and the many volunteers who sorted medical supplies and packed shipping containers.

Now that we have settled in, we are actively soliciting donations of supplies and equipment. Currently, a shipment to support our cardiac programs in St. Petersburg is underway. Contact Jennifer Castner at the H2H office to volunteer or donate supplies and equipment.

Special Points of Interest

- Vendors donated over $600,000 worth of supplies for our Sep 99 mission!
- In 1999 we shipped 8—40' containers of medical supplies globally!
- Read about our 10th Anniversary Reunion on page 2
- Sign up to volunteer!
- Let us know about free or discounted warehouse space.
- Donate Frequent Flyer miles to Heart to Heart.

WELCOME New Board Members

Heart to Heart is pleased to announce that over the course of the last year three new board members have joined H2H. They are: Debbie Chapman, Steve Holland, and Robert Kim Woodward. All three are long time affiliates of Heart to Heart and have shown their commitment to our mission by contributing their time and expertise over many years.

Debbie Chapman has had a long time association with Russia; she made the first of many visits in 1970. She speaks Russian fluently and has worked with Heart to Heart for years, assisting in travel arrangements through her business, UNIGLOBE Connoisseur Travel in San Francisco. Debbie is currently the President of the Board of Directors at the Oakland-Nakhodka Sister City Association. In addition to her business sense, Debbie lends a great deal of energy and enthusiasm to the Heart to Heart Board.

Steve Holland is the Secretary/Treasurer of the Heart to Heart Board of Directors. Steve has also been affiliated with Heart to Heart for over five years and was instrumental in securing the donation of a heart-lung machine through the Rotary Club of Berkeley. The acumen he has acquired as President of Fidelity Insurance in Berkeley is proving invaluable to Heart to Heart.

Robert Kim Woodward has been a long-time supporter of Heart to Heart. He has been on eight H2H medical trips to Russia over the last eight years. He has enjoyed a lengthy, multi-faceted career in the medical field. Currently he is the Assistant Administrator for Clinical Operations at Vencor Hospital in San Leandro. Kim has assisted H2H in many ways, ranging from refurbishing medical equipment to performing needs assessments at Russian hospitals in St. Petersburg, Russia facilities.

Welcome new Board Members! **Thank you** to all of our Board Members for your hard work in 1999!

17th Humanitarian Aid Mission

continued from page 1

associated with open-heart surgery. Heart to Heart medical experts believe this technique will be especially beneficial to our Russian colleagues, who struggle daily to perform highly complex medical procedures while lacking even the most basic medical equipment and supplies.

Volunteer Opportunities

Without volunteers, Heart to Heart would not be able to accomplish nearly as much. We need and appreciate *any* help you can provide! We need:

- A **Webmaster** to update and launch our website.
- A **Fundraising and Public Relations Aide** to tell the world about H2H.
- **Day-time Data Entry** to keep our database in top form.
- **Biomed Techs** to inspect and repair medical equipment.
- **Warehouse volunteers** to help sort medical supplies in preparation for shipment. Medical background a plus!

We're Moving! In early February 2000, the Heart to Heart office will be moving to a new location in the non-profit business community of Preservation Park.
Our new address will be:

Raymond House
655 13th Street, Suite 200
Oakland, CA 94612

Our phone and fax numbers will remain the same. The staff and board are excited to join other vibrant non-profit organizations based in Oakland. Come visit our new office in February!

Heart to Heart Fact Sheet

Heart to Heart is a non-profit organization based in Oakland, California that provides free medical services, extensive training and education, and medical supplies to sponsored hospitals in St. Petersburg, Russia.

Founded in 1989, Heart to Heart is dedicated to improving the quality of medical care in Russia, as well as helping the Russian medical system to become self-sufficient. To this end, Heart to Heart sends approximately 1-3 teams of volunteer medical professionals annually to Children's Hospital #1, and Adult Hospital #2, to integrate the latest American cost-effective and life-saving diagnostic and surgical techniques into the daily practices of pediatric and adult cardiac care programs in St. Petersburg.

We Couldn't Do it Without You!

Heart to Heart would like to gratefully acknowledge the support of:

- Kristy Scott and World Emergency Relief for their responsiveness and assistance in shipping supplies from our warehouse.
- Hersh Saluja and E2 Consulting for the generous donation of a van to support our warehouse operations as well as financial support.
- Nika Thayer and the Thayer Townsend Foundation for continued financial support.
- Linn Lee and Ramona d'Viola for their skilled and generous assistance with publishing our newsletters and other PR materials.
- Gary Koenig for ongoing computer and database support.
- Debra Littrell, Judy Thomson, and Jennifer Tombestin for organizing a wonderful Reunion event.

HEART TO HEART

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email: jennifer@heart-2-heart.org

Reunion Event

The Heart to Heart 10th Anniversary Reunion was a wonderful showcase of past and present volunteers whose incredible involvement and support over the last decade has kept the organization strong. The event took place at the Snow Building in the Oakland Zoo, on Sunday, November 7th, coincidentally also the 82nd anniversary of the 1917 Russian Revolution. The entire decade was well-represented: volunteers from the first trips in the early 90s, those who collected and stored medical supplies in their garages, warehouse and office volunteers, as well as more recent trip participants.

The formal program included brief presentations by new Executive Director Josie Barry-Everett, founder J. Nilas Young, M.D. and current Chairman of the Board of Directors, Pate Thomson, M.D. Drs. Young and Thomson presented accolades, certificates and beautiful hand-blown glass hearts to volunteers whose involvement over the past ten years habeen instrumental in carrying out H2H's mission. Those receiving awards were: Jill Bonifield, Mary Ellen Connelly, Cathy Fleischman, Corky Hastings, Ella Lvov, Bea Morgan, Elaine Shea, Jennifer Tomberlin, and Karen Wise. Heart to Heart simply could not continue without the enthusiasm and dedication of our volunteers.

Many attendees brought photo albums illustrating ten years of trips to St. Petersburg. The room was also decorated with a pictorial history of Heart to Heart's first ten years providing medical humanitarian aid to the citizens of St. Petersburg. The midday event concluded with a small silent auction of Russian souvenirs. The 10th Anniversary celebration will continue into next year, to mark ten years since the first trip to St. Petersburg in 1990.

Drs. Nilas Young and Pate Thomson congratulate Jill Bonifield.

UPCOMING

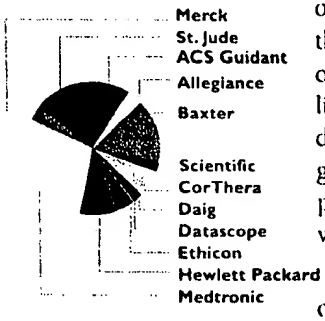
Programs and Events

In a collaborative venture with IntraCom of Alameda, CA and the Medical Academy for Postgraduate Studies of St. Petersburg, Heart to Heart assisted in sending the first live international transmission of echocardiographic images via the internet in September, 1999. Still to come in 2000—enhanced resolution of images and real-time transmissions. Heart to Heart is seeking funding to enable Russian physicians to have the technical capacity to transmit/receive echocardiographic images on a permanent basis. Our fundraising goal for this project—including in-kind support—is $100K.

- A pediatric cardiac trip to Children's #2 in St. Petersburg is in the works for May 2000.
- Another adult cardiac trip is being planned for Fall 2000.
- Read the article on page 3 on a new joint project with Russian colleagues at the Medical Academy of Post Graduate Studies. This pilot project will study the prevalence of potential Rheumatic Fever-producing streptococcal infection in school-aged children.

Medical Vendors Give Adult Trip No. 5 A Huge Boost

The September 1999 trip to the City Center for Cardiac Surgery at Adult Hospital No. 2 in St. Petersburg would not have been possible without the extremely generous donations of 14 medical vendors. Together, they contributed over $600,000 worth of supplies and equipment. On trips like these, teams take everything from disposable gloves to pacemaker programmers in order to ensure that planned surgeries and diagnostic work go off without a hitch.



Company representatives not only donated supplies, but their time spent on paperwork and shipping arrangements as well.

Give our corporate donors of medical supplies a large round of applause: Allegiance, Baxter, Boston Scientific, Cor Therapeutics, Daig, Datascope Corp., ACS Guidant, Herzog Surgical, Hewlett Packard, Johnson & Johnson, Medtronic, Merck, Stryker and St. Jude. Thank you for your support!

Warehouse Assistant Keeps Things Running Smoothly

Lynette Baldwin, Warehouse Assistant, at her BOSS graduation.

A special word needs to be said abou Lynette Baldwin, the Heart to Heart ware house assistant. Lynette has recently cel ebrated her one-year anniversary of work ing at the warehouse.

Without Lynette, the warehouse op erations could not exist. She was instru mental in helping us move 3 times thi year, taking care of the many details as sociated with packing and unpacking huge volume of valuable supplies.

Lynette is always ready to help and her great organiza tional skills make it possible to locate specific things in ou large inventory with relative ease.

Lynette recently graduated from the Building Opportuni ties to Self-Sufficiency Program in Oakland and was honore for her outstanding achievements. Heart to Heart is proud t have Lynette working as part of our team!

Honduran Doctor's Gratitude

Dr. Claudio Casas, a recent recipient of a H2H shipment sent through World Emergency Relief, expresses his thanks in the following letter.

Young Honduran benefits from H2H shipment.

Dear WER and H2H,

Today I came back from the Frontier after delivering 200 water pipes and supervising how the construction is going. I was tired, hungry, just wishing to come back home, and just before I could get my truck a woman approached me carrying her 7-year-old daughter with the right arm broken.

I saw that little creature holding her arm and such pain on her dirty face that I forgot my hunger and rush and started healing her. I was so happy to have the medical stuff you brought, I opened a box and all was there, the bandages, the cast, the sling, the analgesics, the antiseptics and antibiotics to prevent an infection on some brushes on her knees.

Dr. Casas with new mother whose baby he delivered.

In just 45 minutes after a painful scrim that dirty, crying face was smiling. Her father came before me and with a broken voice asked me "How can I pay you, Doctor?" I answered, "Do not forget me in your prayers." With out your medical stuff this story could be different and full of pain for this child and her parents who have not even a cent to pay transport and a physician fee.

After that I drove until my home and was thinking about this all the way. I [have] found what people like us [doctors] are in this world for. Technically to fix a little broken arm is not a big deal, is just one of dozens of stories that I see every day. Thanks to God these stories end differently because of what we are doing. It does not matter how little the things we do are, but by doing them we are giving hope to this world of need, and that, my friends, is making a difference.

Your friend, Claudio

International Shipping News

Over the past year, Heart to Heart has sent over eight 40' foot shipping containers to needy countries around the globe valued at a total of nearly $2 million. Destinations included: Guatemala, Guinea-Bissau, Honduras, India, Mexico, Nigeria, Philippines, and Russia.

These shipments to needy third world programs were coordinated by other local non-profits including: World Emergency Relief, the AIMS Project, Pleasanton Community Church, and Westminster Presbyterian Church. The medical equipment and supplies, which include hospital beds, wheelchairs, bandages, catheters, gloves and much much more are procured by Heart to Heart from numerous Bay Area Hospitals. Thanks to the joint efforts of Heart to Heart and these other charities, valuable medical assistance is reaching our neighbors-in-need around the globe.

Project to Decrease Russian Rheumatic Fever in Development

Heart to Heart is developing a joint project with Russian colleagues at the Post Graduate Medical Academy in St. Petersburg, Russia. This pilot project will study the prevalence of potential Rheumatic Fever-producing streptococcal infection in school-aged children.

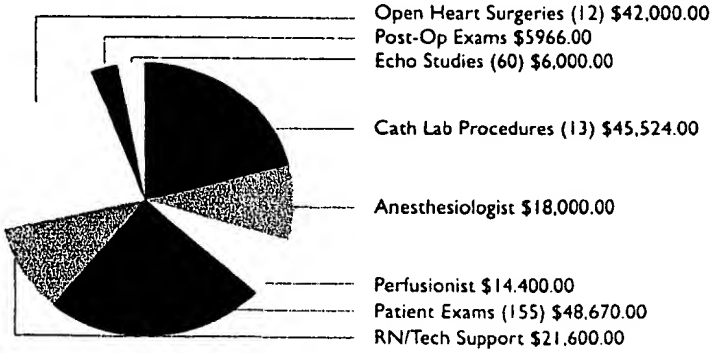
Rheumatic Heart Disease (RHD) is a late-occurring complication typically arising decades following the appearance of Group A hemolytic streptococcal sore throat. Members of recent H2H Adult Cardiology teams have seen first-hand the ravages of this disease and have provided both medical and surgical palliation to those stricken with its complications.

Despite often-minimal initial symptoms, it is the later complications of Rheumatic Heart Disease that are significantly straining the limited resources of the Russian Federation. Since prevention of streptococcal infection is inexpensive, as part of this demonstration project we hope to partner with pharmaceutical companies and provide antibiotic therapy when appropriate.

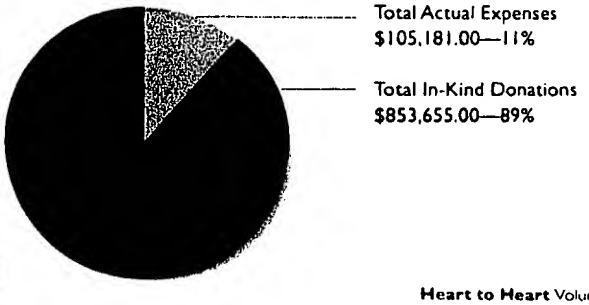
Heart to Heart is currently seeking funding to launch this Demonstration Project in St. Petersburg.

September 1999 Humanitarian Aid Mission Statistics

In-Kind Services



Overall Program Value



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23-Feb, 2000 **Smith & Nephew granted approval to market US fracture therapy**
Smith & Nephew Orthopaedics today announced that the company has received approval from the U.S. Food and Drug Administration to market its ultrasound technology for the treatment of established non-union bone fractures. With this most recent approval, the technology is the only bone stimulation treatment indicated for both fresh and non-union fractures. Smith & Nephew develops and markets tissue repair products.

17-Feb, 2000 **FDA approves Kodak's telemedicine system**
Eastman Kodak Co. today announced that the U.S. Food and Drug Administration has granted the company approval to market its two-way health monitoring system for homebound patients. The technology, which works with standard telephone lines, permits full audio and video communication between care providers and patients and transmits vital signs and other data from the home to the provider's office. Kodak's Health Imaging Division specializes in products and services for the management of images for diagnostic and non-diagnostic applications.

17-Feb, 2000 **IntraCom announces ultrasound transmission technology**
IntraCom Corp., which specializes in Internet technologies for the healthcare industry, today announced the engineering release of its transmission system that enables ultrasound images to be transmitted in real time over the Internet. The company has received marketing clearance for the product from the U.S. Food and Drug Administration. The company expects final release during the second quarter of 2000.

GOVERNMENT RELATIONS UPDATE
UPDATE 2/28/2000

Ultrasound on the Internet?

The FDA granted clearance to Internet healthcare specialty company IntraCom to market its MedEcho system. MedEcho transmits ultrasound images in real-time over the Internet images from medical centers to physician offices and clinics. Final release of MedEcho is anticipated for the second quarter.

Author: Health Industry Distributors Association (HIDA)
URL:
http://www.hida.org/govtrelations/updates/article.asp?Article_ID=328&Subj_ID=139

Los Angeles

DAILY NEWS

BUSINESS

Markets ◆ Analysis ◆ Finance

Thursday, February 17, 2000

Internet ultrasound technology expected

By Jason Z. Cohen
Staff Writer

THOUSAND OAKS — IntraCom Inc., a medical technology company, is expected to announce today the release of a product that will allow the transmission of ultrasound images live over the Internet.

Jim Nations, president of the Thousand Oaks-based firm, is scheduled to introduce the product, MedEcho, today to the Warburg Dillon Read Global Healthcare Services Conference, a gathering of health care analysts and investors in New York.

IntraCom is seeking $20 million in financing as a final round of private investment before an initial public offering planned for later this year, Nations said.

The company plans to market its products to doctors specializing in cardiology and obstetrics, he said.

MedEcho will enable a doctor to view a live ultrasound image over the Internet from a remote location, Nations said.

The equipment required to transmit the images is being installed in 34 hospitals with multiple users in each.

"Being able to do those live transmissions on a real-time basis is really a lifesaving technique," Nations said.

The company said it has received approval from the federal Food and Drug Administration to market its product.

FEBRUARY 25, 2000

SACRAMENTO Business Journal
EL DORADO PLACER SACRAMENTO YOLO

Software sends ultrasound images over the Internet

KATHY ROBERTSON / STAFF WRITER

IntraCom Corp., a healthcare specialty firm with technical headquarters in Sacramento, hopes to hit the big time with a new software product that sends ultrasound images over the Internet.

A privately held company with corporate offices in Thousand Oaks and Alameda — and about 15 people doing technical work on Ramos Circle in Sacramento — IntraCom is an Internet start-up that hopes to go public before the end of the year.

The potential is huge. About 38 million ultrasound procedures are done nationwide each year, and demand is growing for quick access to test information.

IntraCom appears to be the first to send ultrasounds over the Internet, observers say. If the market responds, it could be good news for Sacramento.

"We are excited about our research and development," said IntraCom spokesman Calvin Naito. "We expect to grow."

Meet MedEcho: The company has 30 placement agreements for the new product, including installation at Colusa Community Hospital within the next few weeks.

There, the product — dubbed MedEcho — would be used in conjunction with the telemedicine program at the UC Davis Health System. The university is looking into use of the product locally, too.

IntraCom released engineering details of MedEcho at investment house Warburg Dillon Read's global healthcare services conference in New York City last week. Product release is expected this spring.

An earlier version has been installed at three Bay Area sites, including the UC San Francisco Medical Center, San Francisco General Hospital and the San Francisco Veterans Affairs Medical Center.

What's done now: Ultrasound is widely used to diagnose heart disease and evaluate fetal development. Approved by the U.S. Food and Drug Administration, MedEcho transits full-motion diagnostic images across the Internet.

Currently, patients who undergo tests such as an echocardiogram typically wait a week or more for technicians to send a VCR tape to the physician's office for viewing and analysis. MedEcho would eliminate the lag time, giving a physician immediate access to the test.

"It'll enable patients to get a speedier reading and turnaround for surgery," said Wanda Smead, telemedicine coordinator at Colusa Community Hospital.

The hospital now does six to eight echocardiograms a week. Turnaround takes seven to 10 days, she said.

"If all goes as planned, (our physician) will be able to pull up the Web page, punch in the patient identification number and read it from his home," Smead said. "A lot of our patients are elderly, so driving to Sacramento is an issue. We are a small 46-bed hospital competing with larger facilities in Yuba City, Marysville, Woodland and Chico."

The time factor is the product's maj benefit, said Ravi Nemana, lead techno gist for the telemedicine program at UC

UCD must justify the cost. IntraCom not selling the product, but plans to lease for a monthly fee of $500 to $700.

Nemana has some practical concer that sonographers in the field may not g the correct cardiac view to satisfy tl physician deciphering the test at the oth end. Others agree.

"This technology is coming — it's goi to happen," said Terry DuBose, project

DENNIS McCOY / SACRAMENTO BUSINESS JOURNAL

Carl Daniel, software engineer at IntraCom Corp., demonstrates the promising MedEcho

Launched on credit cards: Founded in March 1996 in Thousand Oaks, IntraCom initially was financed by credit cards. Four rounds of private financing between mid-1997 and the end of 1998 generated start-up capital of $11 million from more than 400 private investors.

Now in the midst of obtaining interim financing of $20 million, the firm plans an initial public offering by year's end.

While other firms such as Mountain View-based Acuson Corp. provide complex systems to display, archive and retrieve ultrasound images, IntraCom is the only outfit seeking to use the Internet for this purpose, observers say.

"We see ourselves as a clinical service provider," Naito said. "A lot of Internet companies are content-oriented. We actually provide a service that's used for clinical evaluation."

rector of the Diagnostic Medical Sonography Program at the University of Arkansas. "My fear is that it's very operator-dependent. No matter how good the person is at the other end, you can only assess what you see."

There are concerns about privacy of medical records and Internet security.

"This is a bold move in a conservative healthcare environment," Nemana said. "The idea is beautiful, although probably a little before its time."

The Business Journal
SERVING SAN JOSE AND SILICON VALLEY
MARCH 10, 2000

Software will send ultrasound images over Internet

BY KATHY ROBERTSON
Special to The Business Journal

IntraCom Corp. hopes to hit the big time with a new software product that sends ultrasound images over the Internet.

The privately held company has technical headquarters in Sacramento and corporate offices in Thousand Oaks and Alameda.

The potential is huge. About 38 million ultrasound procedures are done nationwide each year, and demand is growing for quick access to test information.

IntraCom appears to be the first to send ultrasounds over the Internet, observers say.

"We are excited about our research and development," said IntraCom spokesman Calvin Naito.

IntraCom released engineering details of the product, dubbed MedEcho, recently. Product release is expected this spring.

Ultrasound is widely used to diagnose heart disease and evaluate fetal development. Approved by the U.S. Food and Drug Administration, MedEcho transits full-motion diagnostic images across the Net.

Currently, patients who undergo tests typically wait a week or more for technicians to send a VCR tape to the physician's office for viewing and analysis. MedEcho would eliminate the lag time, giving a physician immediate access to the test.

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While other companies such as Mountain View-based Acuson Corp. provide complex systems to display, archive and retrieve ultrasound images, IntraCom is the only outfit seeking to use the Internet for this purpose, observers say.

The time factor is the product's major benefit, said Ravi Nemana, lead technologist for the telemedicine program at the University of California, Davis.

Mr. Nemana has some practical concerns that sonographers in the field may not get the correct cardiac view to satisfy the physician deciphering the test at the other end. Others agree.

"This technology is coming—it's going to happen," said Terry DuBose, project director of the Diagnostic Medical Sonography Program at University of Arkansas. "My fear is that it's very operator-dependent."

There also are concerns about privacy of medical records and Internet security.

"This is a bold move in a conservative health care environment," Mr. Nemana said. "The idea is beautiful, although probably a little before its time."

Kathy Robertson is a staff writer with the Sacramento Business Journal, a sister publication. You can reach her at krobertson@amcity.com.

Intracom Offers Doctors Ultrasound on the Internet
2/17/0 16:4 (New York)

Intracom Offers Doctors Ultrasound on the Internet

New York, Feb. 17 (Bloomberg) -- IntraCom Corp., a four-year-old online health care company, today unveiled a computer system that transmits ultrasound images over the Internet.

IntraCom President James Nations said three hospitals in the San Francisco area have installed the system, called ``MedEcho,'' and 31 others have agreed to lease it. The cost is $750 per month for hospitals and medical centers, and as little as $30 per month for physicians to lease the software for their personal computers.

A closely held corporation with 43 employees based in Thousand Oaks, California, IntraCom reported revenue of only $100,000 last year. Nations projects sales of up to $20 million this year, growing to $87 million by 2002.

IntraCom was founded in 1996 with more than 400 investors contributing $11 million for research and development. Nations said he hopes to raise $20 million more by the end of the year and $80 million more from an initial pubic offering.

``I'm enthusiastic about technology on the Internet,'' said Terry DuBose, technology analyst for the Society of Diagnostic Medical Sonographers. ``They should do well.''

DuBose said two Seattle-based companies have produced ultrasound machines that can transmit images on the Internet. There are no more than 10 similar companies in the world, he said, and, unlike MedEcho, their technology cannot be added to any other ultrasound machine.

Nations said physicians in the U.S. spend $3 billion annually on what he called ``sub-optimal'' transmission of more than 38 million ultrasound procedures.

``We want a piece of that,'' he said. ``We can save them time and money.''

MedEcho offers images using patented data compression technology that digitalizes and encrypts ultrasound images. The system was approved by the U.S. Food and Drug Administration last year.

``The problem is that sonography is so operator dependent that you need to be sure the person operating the equipment is properly educated and credentialed,'' DuBose said. ``That is the downside of this, and it is a high risk. So far we have not moved very fast for that reason, but we are going to go there.''

Bill Varner-- in the New York newsroom (212) 893-3010/jk

Story illustration: to view more headlines on health care type NH HEA <Go>.

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-0- (BN) Feb/17/2000 16:04

Diagnostic Imaging Online
March 2, 2000

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Software package makes Internet-based real-time ultrasound a reality

A growing number of hospitals and radiology groups are looking to the Internet as an easy and inexpensive tool for enterprise-wide management of images and reports. Now a new Food and Drug Administration-approved software and hardware package is making the transmission and review of ultrasound video clips over the Internet a practical prospect as well--even in real time.

Developed and marketed by IntraCom, a startup software developer and clinical service provider based in Thousand Oaks, CA, the MedEcho package works in conjunction with the company's Web portal to allow the viewing of ultrasound images in real time over the Internet. This is IntraCom's first commercial product, and the first in the company's proposed MedDesk suite of Internet-based healthcare applications. The FDA clearance covers all ultrasound indications, including cardiology, ob/gyn, and pediatric and fetal echo exams.

Using a lossless wavelet-based approach optimized for ultrasound, MedEcho can transmit full-size, full-motion video images at 15 frames per second or better over standard phone lines. Physicians on the receiving end can retrieve selected segments in the original full-resolution image file. They can also view exams in progress and guide the technician or physician acquiring the images to obtain the best diagnostic views.

In addition to the software, which runs on any Pentium-based PC, IntraCom provides the image-capture CPU that is attached to the hospital's ultrasound system, and an online service that makes the images accessible outside the exam room. Like several of the new Internet-based image-management and archiving products, MedEcho is used in conjunction with IntraCom's Web portal (the URL is still pending) to link the desktop system at the remote site to the originating hospital or medical center. The portal is also designed to provide transcription and e-mail services, allow patients to access their medical records and medical literature, and link with several clinical and consumer-oriented e-commerce sites.

IntraCom charges customers a flat subscription fee that covers the hardware, software, and access to the online service. On the acquisition side, hospitals pay $750 per month, which includes the acquisition unit and a server to help route the images; on the remote side, physicians pay $100 per month.

-By Kathy Kincade

FDA grants clearance to Internet ultrasound system

MedEcho works with Web portal for real-time imaging

The FDA has granted marketing clearance to IntraCom, a software developer and clinical service provider, for MedEcho, a software and hardware package that works in conjunction with the company's Web portal to enable ultrasound images to be transmitted and reviewed in real-time over the Internet. This is IntraCom's first commercial product, and the first in the company's proposed MedDesk suite of Internet-based healthcare applications.

MedEcho is also the first Internet-based system developed specifically for real-time, full-motion ultrasound imaging, according to Jim Nations, president of Thousand Oaks, CA-based IntraCom. The FDA clearance covers all ultrasound indications, including cardiology, OB/GYN, and pediatric and fetal echo exams.

At the heart of MedEcho are several patent-pending technologies and intellectual properties, including proprietary compression algorithms, video streaming technology, user interfaces, a search engine, and online medical transcription capabilities. Much of this technology has been in development since the company was established in 1996.

The compression capabilities are critical to the system's success, according to Nations. Using a lossless wavelet-based approach optimized for ultrasound, MedEcho can transmit full-size, full-motion video images at 15 frames per second or better over standard phone lines. In addition, physicians on the receiving end can retrieve selected segments in the original full-resolution image file. Physicians at remote sites can also view exams in progress and guide the technician or physician acquiring the images to obtain the best diagnostic views.

"Ultrasound manufacturers and doctors live and die by the quality of the image, and it is our job to deliver that on the other end," Nations said. "This is not something that can just be pulled off the shelf, because you can lose frames or resolution (that way). You have to develop the algorithms."

In addition to the software, which runs on any Pentium-based PC, IntraCom provides the image-capture CPU that is attached to the hospital's ultrasound system, and an online service that makes the images accessible outside the exam room and beyond. As with several of the new Internet-based image-management and archiving products, such as InDex from Insite One (*SCAN* 2/2/00), MedEcho is used in conjunction with IntraCom's Web portal (the URL is still pending) to link the desktop system at a remote site to the originating hospital or medical center.

The portal is also designed to provide transcription and e-mail services, allow patients to access their medical records and medical literature, and link with several clinical and consumer-oriented e-commerce sites, such as Amazon.com and OfficeMax.com. IntraCom has strategic relationships with several of these sites, as well as pending relationships with various communications and connectivity companies, including MCI Worldcom, AT&T, Cisco Systems, Oracle, Microsoft, and Hewlett-Packard. The company is also establishing a partnership with an online, off-site archiving service to support its MedVault image and patient record storage application.

"What we have tried to do is create a virtual reading room," Nations said. "MedDesk essentially functions like a desktop that includes the imaging component."

IntraCom charges customers a flat subscription fee that covers the hardware, software, and access to the online service. On the acquisition side, hospitals pay $750/month, which includes the acquisition unit and a server to help route the images; on the remote side, physicians pay $100/month for software and access to the server.

Final release of MedEcho is expected next quarter. The system is currently in place at four evaluation sites around the country, but IntraCom has 34 pending contracts that will be fulfilled over the next two months, according to Mark Kiene, national director of sales. ■

Standards Update

Integrating systems outside the radiology department

The first meeting of the new DICOM Working Group 20, a joint DICOM/HL7 committee that deals with issues in integrating images into information systems, occurred at the recent HL7 meeting in San Diego.

The impetus for this joint standards activity is twofold. It has become increasingly clear that when providing patient information to a physician, including an image can complement and enhance that information. Images are also helpful for physician reimbursement. Under the new HIPAA (Health Insurance Portability and Accountability Act) regulations in the U.S., attaching digital images to an electronic claim would facilitate and simplify information exchange between payers and providers, in accordance with HIPAA mandates.

IHE, the joint activity being sponsored by RSNA and HIMSS to demonstrate and achieve interoperability between imaging and information systems, is also driving the need to address integration issues. These issues include:

—Information models. An accurate information model not only specifies the information involved in the transaction but explicitly defines the behavior and/or intention of the sender and receiver. Information models also define relationships. Both HL7 and DICOM have model definitions; alignment of both models is critical for interoperability.

—Attributes. HL7 and DICOM need to accommodate one another's attributes so that information can be correctly aligned and communicated through the interface. For example, HL7 has certain identifiers that help to manage orders and their results. Imaging systems should accommodate these attributes and maintain them as part of their schedule list, or even store them in the image header.

—Length. DICOM is more exact in length specification than HL7. Some data elements in HL7 have an overall length limit while DICOM has a maximum length specification for the specific items that make up that data element. Again, ensuring that these elements align on both sides is necessary for true data compatibility.

—Functionality. There are some instances where either an HL7 or a DICOM interface can be used. For example, the normalized patient/study management services in DICOM exchange patient demographic information, something that can also be done with HL7 transactions. The challenge is to determine which service best fits the specific application.

—Encoding. HL7 is strictly character-based. However, DICOM has a powerful definition of data types for the encoding of image pixels and other binary data, in addition to the character-based information, such as patient demographics. It will take some work to accommodate these DICOM objects within the HL7 object framework, especially the new HL7 patient record architecture proposals.

—Herman Oosterwijk, president, OTech Inc. (herman@otechimg.com)

▼ Health Care

System Lets Doctors Make Diagnoses Via the Internet

By JENNIFER NETHERBY
Staff Reporter

Quite a few unlikely things have been made possible by the advent of the Internet, but few would have foretold that the technology would lead to medical exams in which patient and doctor would never have to meet in person.

Thousand Oaks-based **IntraCom Corp.** has created a system that makes this phenomenon possible. With the company's product, MedEcho, doctors will be able to tap into ultrasound images, broadcast live in real time over the Internet, to do everything from diagnosing heart conditions to determining the sex of a baby for pregnant mothers.

The product is one of the few available that allow doctors to access diagnostic-quality moving ultrasound images from remote locations.

"There are a shortage of specialists in the U.S.," said founder and Chief Executive Fritz Braunberger. "With MedEcho, all you need is an ultrasound machine and a technician in a rural area or country and you can reach a top doctor at UCLA instantly who can then determine what needs to be done. It increases access (for patients)."

In December, the company got FDA approval to market MedEcho. It has since released a beta-test version of the product that is currently being used by about 30 hospitals nationwide, and IntraCom officials plan to launch the final product in the second quarter. The system is geared primarily at cardiologists and obstetricians who use ultrasound machines.

The company has so far raised $11.5 million in private funding and plans to launch an IPO later this year.

New advances

Until recently, it had been impossible to send diagnostic-quality moving images over the Internet because there wasn't sufficient bandwidth to accommodate moving pictures with the necessary detail.

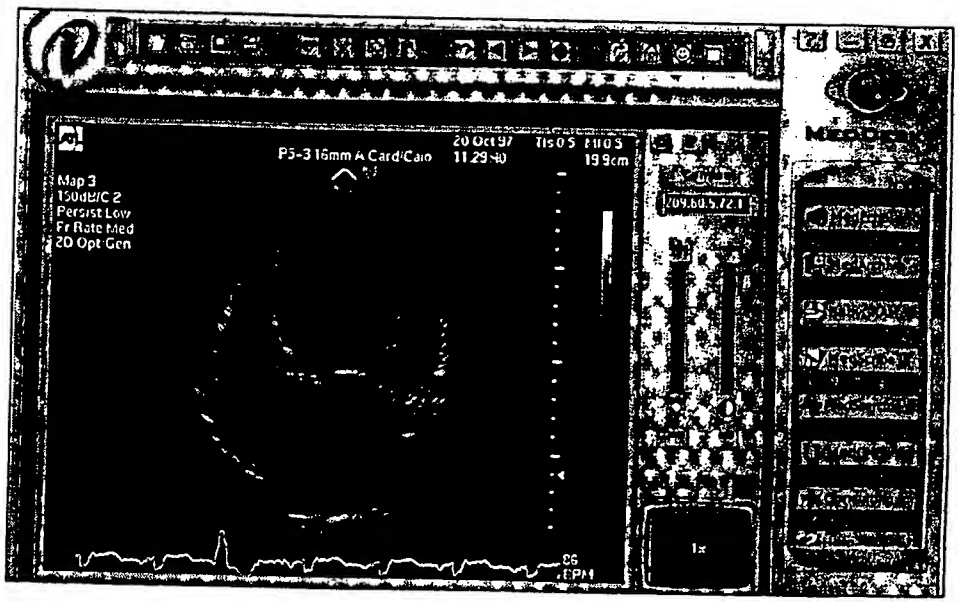
"For pediatrics, the diagnostic quality is so rigorous," said Pierre Wong, director of cardiology at Childrens Hospital L.A. "With fast heart rates of kids, you need almost broadcast-quality video."

Childrens Hospital will test MedEcho by connecting with L.A. County-USC Medical Center over the next several months before deciding whether to buy into the final version of the system. County-USC will be able to transmit ultrasounds to pediatric specialists at Childrens Hospital for instant diagnosis.

MedEcho consists of a device that plugs into an ultrasound machine and translates the information to digital form, which is transmitted over the Internet or other high-speed connection and available to a physician or specialist through a PC on the other end. Any computer that is equipped with the MedEcho client software and has a password for the Web site with the image can log on.

Thus, a technician can operate the ultrasound on the patient and the doctor can view the screening from a remote location, while telling the technician where to scan over the phone.

MedEcho uses a specially created algorithm that allows hospitals to send the ultrasound images at up to 30 frames a second, substantially faster than the average of seven frames a second for other real-time and streaming video, Braunberger said.



Online: IntraCom technology can be used to do long-distance ultrasounds.

The additional speed is mandatory for physicians to accurately diagnose a patient, Wong said. The images are saved so that doctors can go back and review them at a later time.

Positive feedback

UC Irvine Medical Center has been using the beta version for several weeks and Cheryl Reid, associate professor of medicine, said so far it has lived up to the hype.

"It's able to transmit moving images, which is difficult with ultrasounds," Reid said. "Up to now, the Internet has been used primarily in radiology to transmit still images."

IntraCom's biggest obstacle so far has been cost, Braunberger said. The company at first tried to sell its machines to hospitals, but a lack of interest convinced them to lease the equipment and tack on an additional charge every time it is used, thus making it more affordable. Hospitals using the beta version of MedEcho are not charged.

IntraCom also faces increased competition in the field. Although it is the only company yet to win FDA approval for its system, **Hewlett Packard** and makers of ultrasound machines are working on similar technology.

"The whole field of video medicine over the Internet is a big field," Wong said. "It's such an early technology and it's still coming into its own."

IntraCom got its start at an Agoura Hills office supply store in 1995, when Braunberger bumped into a friend of his from high school. Braunberger was working on an Internet company, Megashop, which wasn't catching on, and James Calonge, now senior vice president of IntraCom, was a quality assurance auditor for a hospital. The two began talking and outlined a business plan on

Title: Ultrasound software hits the Internet

Date: 5/1/2000; **Publication**: Hospitals & Health Networks; **Author**: Manos, Diana

Hospitals & Health Networks

05-01-2000

Ultrasound software hits the Internet

Byline: Manos, Diana
Volume: 74
Number: 5
ISSN: 10688838
Publication Date: 05-01-2000

IMAGE IS EVERYTHING

For $500 to $700 a month. MedEcho can connect your docs to remote viewing of ultrasound images via the Internet.

Doctors will be able to read ultrasound images outside the hospital lab and receive test results faster thanks to new software expected to hit the market soon. MedEcho, developed by Intracom, Thousand Oaks, Calif, will allow echocardiograms and other ultrasound tests to be sent over the Internet to any e-mail address on any personal computer, including laptops. The digital ultrasound images can be sent in live or as a recording. A doctor can retrieve selected segments in the transmission for later review In addition, doctors could use MedEcho to help a technician conduct a live echocardiogram at a distant location.

The FDA has already approved the product. MedEcho will cost roughly $500 to $700 a month for a hospital, says Intracom spokesman Calvin Naito.

Physicians at Veterans' Administration Medical Center in San Francisco have tested MedEcho for a year:Nelson Schiller,M.D.,a cardiologist and director of the medical center's cardiology lab, says MedEcho cuts the time it takes to get test results on the average cardiology patient from a week to a couple of days. And the images are much clearer than the videotaped recordings that doctors currently use, he says.

What's more, Schiler says, "the opportunity to view test results offsite enables a doctor to be a consultant to anyone, anywhere in the world:' Nelson says that could encourage more patients to seek second opinions, a potentially lucrative opportunity for revenue strapped academic medical centers. "Its a real dot.com solution."

e-HEALTH: HEALTH INFORMATION ON THE INTERNET — MARKET AND CORPORATE DEVELOPMENTS

Introduction: Content, Commerce, Connectivity

e-Health is a general term for a rapidly emerging application of Internet technology and content that has implications for all aspects of the healthcare industry. e-Health has current or potential use for all the elements of the healthcare system, including consumers (the worried well), patients (consumers with conditions or diseases), healthcare providers (physicians and allied health personnel), institutions, healthcare service providers (clinical laboratories, for example), and others.

Larry Downes, of Diamond Technology Partners:

"The Internet has changed industries forever - for example, music, automotive, news media, discount retailers, shipping, recruiting - have all been profoundly changed by the Internet in a short amount of time. Right now the healthcare industry is in the midst of seismic change inspired by the Internet and healthcare professionals need to be prepared."

"A powerful combination of digital technology, increased competition, and government-sponsored standards for patient information is creating a patient-centric model for healthcare. Already, new entrants have seized the initiative, formed bizarre coalitions, and begun the process of demystifying medicine and health."

Dr. Dennis J. Streveler, of Healtheon Corp.:

"This phenomenon has barely begun. And just as cells differentiate themselves through evolution and become controlled by a central nervous system, so too will the Internet become a sort of central nervous system for healthcare."

"The next step: disintermediation. Similar to what's happened in so many of the world's other information industries, people will start to do for themselves what others once had to do for them. Like the ATM machine in banking and the self-service pump at your local gas station, the Internet encourages a 'do-it-yourself' mentality, without surrogates such as call centers that waste billions of dollars doing what consumers can (and want to!) do for themselves."

The Internet's open architecture, accessibility, and growing acceptance make it an increasingly important means of information exchange for both business-to-business and business-to-consumer interaction. Use of the Internet is expanding rapidly from simple information publishing, messaging and data gathering to critical business transactions and confidential communications.

According to Robert Bell, national director of the Canadian healthcare practice at Ernst & Young Consulting:

"We believe that the Web will probably create a totally new delivery standard for healthcare." For example, emergency room overcrowding could be cut dramatically by a practice known as "tele-triage," using a help line of online services to provide patients with advice about whether or where they should go for treatment. "We know that 40% to 45% of people who avail themselves of emergency departments are looking for information, advice, or opinions and are not really in an emergency condition. Fifty percent of these tend to be women and about half of them are trying to elicit information regarding their kids."

A recent study conducted by Deloitte Research-Health Care Institute (Deloitte Consulting) found that e-health companies raised more than $1 billion in venture capital in 1999. The study also found:

- online advertising spending on health sites quintupled from 1998 to 1999
- online use of healthcare sites is growing twice as fast as general Internet use
- an estimated 39% of a projected total of 116 million U.S. adults online will log on to health sites regularly by 2002.

According to Graham Pallett, of the Boston office of Deloitte Consulting, in spite of the boom in e-health information services, consumers' demands are still not close to being satisfied. "There's an enormous gap between what e-health consumers want and what they're able to get, and there is a tremendous opportunity for those who can bridge it." Pallett notes that consumers want online links with health services, as well as more specific information about conditions and treatments.

According to Alejandro Jadad of McMaster University, major health sites are funded by advertising and sponsorship. But Jadad wonders how long the model of third party payment will last. As consumers increase their demands for more specific information, they may need to pay for this service. Jadad points out that there are some sites that charge fees for certain data. For example, there are some pay-per-use services that compare the performance of different hospitals or physicians, and one particular Web site researches the outcomes of medical tests and procedures for a fee.

The foundation for e-health is clearly in place and poised for dramatic growth.

- Jupiter Communications estimates that 29% of U.S. households are currently online, with an estimated 43% expected to be online by 2002.
- The quality of information and the ease in which transactions can be conducted have increased dramatically.
- Forrester Research contends that e-business in the United States is about to accelerate into a "hypergrowth" phase, and estimates that approximately 11% of all business transactions will be conducted over the Internet by 2003. This is in direct contrast to the less than 1% that occurred over the Internet in 1998.
- Although ways to streamline business processes and lower costs will continue to be discovered, the Cigna Information Group is predicting that conducting business online will save companies worldwide an estimated $1.25 trillion by 2002, compared to an estimated $17 billion in savings in 1998.
- A 1998 survey conducted by "Modern Physician" found that 84% of physicians surveyed used the Internet for e-mail and 78% used the Internet for educational purposes. These uses are expected to increase in the future, especially with the emergence of a new generation of physicians who are familiar with Internet technology.

According to Dr. Sheryl Skolnick and colleagues at BancBoston Robertson Stephens:

"Why should investors look at eHealth companies? Because, in our view, the opportunity is potentially enormous (of the $1 trillion spent on health care every year, $400 billion is spent on administrative costs alone), the technology is here and real, and cost savings are compelling and the fundamental infrastructure change brought about by applying Web technologies to health care cannot be ignored."

"But, the health care industry is unlike virtually every other space in which the Internet is used today. Health care is heavily regulated. It is complex. It involves treating people who don't pay the full cost of their care directly and couldn't determine how much care they should have even if they wanted to. Thus, investors need to be selective in their investment decisions, perhaps to an even greater degree than in more normal businesses. We expect some companies routinely to double or triple in size in each of the next three years, either through internal growth or acquisitions. Faster growth, i.e., Internet speed, is likely in the near term."

The U.S. Department of Commerce summarizes the "wholesale eHealth" opportunity by estimating that these operations could enable up to 50% reduction of administrative costs which are segmented in the table below.

Segment	Healthcare Revenue ($BN)	Administrative Costs ($BN)	Percent of Revenue
Hospitals	500	110	22
Physicians	230	138	60
Health insurance	510	82	16
Medicare/Medicaid	345	69	20
Total administrative		399	

Consistent with the Department of Commerce study, the Health Care Financing Administration estimates that 25% of every healthcare dollar is wasted through the delivery of unnecessary care, performance of redundant tests and procedures, and excessive administrative costs. Considering that the number of transactions generated by a visit to a physician generally ranges from four or five for a primary care encounter to twenty-five for a complex cardiac workup, the administrative burden is enormous.

Claims Processing

In the past, high costs and fees have kept physicians from submitting claims electronically. Of the four billion healthcare claims that are processed in the United

CornerDrugstore.com

CornerDrugstore.com is a cooperative venture endorsed by the National Community Pharmacists Association (NCPA)(formerly NARD); it is the product of a company which builds Internet businesses. CornerDrugstore.com, in turn, has a strategic partnership with Compaq Computer Corporation to obtain the best e-commerce solutions and provide Compaq equipment to participating pharmacies at preferred rates.

As of November 1999, three months after CornerDrugstore.com began enrolling independent pharmacies, approximately 2,500 pharmacies had signed up to participate. Participating pharmacies' Web sites are linked to the nationwide CornerDrugstore.com where patients can access the latest information on health and medicines and receive refill or other medication reminders, in addition to requesting prescription refills with same day pickup or delivery. Independent pharmacies pay $60 per month to participate in CornerDrugstore.com.

Consentsys (Charlotte, NC)

Consentsys provides physician-branded information solutions through its application service provider Internet-based software. Consentsys provides physicians with the systems and services that will allow patients to register and record their medical history through their physician's Web site. The physicians are able to maintain the patient medical record through the same online system, allowing the patient and physician each to have confidential online access to the medical record. The physician is then also able to provide medical information specific to the patient's medical profile through personal e-mails.

As of mid-2000 Consentsys had entered into a strategic partnership with a large multinational pharmaceutical company to sponsor the rollout of the system into the first five to ten medical practices.

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On December 4, 2000 SymRx, Inc. (Rockville, MD) acquired CornerDrugstore.com, a provider of business-to-business and business-to-consumer electronic commerce solutions for the independent and small chain pharmacy marketplace. With the acquisition, SymRx, through the CornerDrugstore brand, provided nearly two thousand independent and small chain member pharmacies with online management tools as well as personalized e-commerce Websites from which to sell prescription and over-the-counter products.

CorSolutions (formerly Cardiac Solutions)

See Ralin Medical

cranespharmacy.com (Minneapolis, MN)

cranespharmacy.com is involved in the development, hosting, and management of customer branded Internet pharmacies for healthcare companies and health focused Web sites. The company provides customized, turnkey e-commerce programs, including product fulfillment, merchandising, consumer loyalty incentive programs, customer service, and marketing planning and support.

CuraSpan (Needham, MA)

CuraSpan, previously known as Integrated Healthcare Networks, is an application service provider which develops technology-based solutions to meet the organizational, communication, and compliance needs of healthcare organizations. The company's flagship product, eDischarge™, was designed by a team of clinical and technology experts to modernize and expedite patient assessment, care planning, and discharge in acute and post-acute settings. eDischarge™ is being positioned as a leading solution for hospitals seeking more rapid and accurate discharge planning procedures. The product allows case managers to disseminate quickly patient information and arrange discharges to post-acute care providers through the Internet. The product helps realize greater efficiencies and cost savings, while also providing case managers more time to attend to patient care.

Cybear Inc. (Boca Raton, FL; public co; www.cybear.com)

Cybear is a development stage company offering products and services using the Internet and Internet-based applications to improve the efficiency of ongoing administrative and communication tasks of healthcare providers who interact to manage patient care. Cybear is developing its Solutions product line, a subscription-based Internet service provider system that provides Internet access and Internet-based applications to physicians, physician organizations, pharmacies, and hospitals, allowing these users to obtain information from Cybear's Web site and other Internet locations.

In March 1999 Cybear introduced its first Solutions product, Solutions MD, a physician-oriented healthcare Internet gateway site that provides its subscribers with a combination of Internet access, healthcare content, software applications to increase user productivity, entry into a comprehensive private communications network for Solutions subscribers and ongoing access to future Solutions products and services.

In February 2000 The Merallis Company formed a strategic alliance with Cybear, Inc. The Merallis expertise in online transaction and information solutions provides Cybear with the tools to expand its online services and provide the physician's desktop with real time managed care information, including claims management.

Cyber-Care (Boynton Beach, FL)

Cyber-Care is offering the Electronic House Call as a device and/or service for home health monitoring.

CyberPlus Corporation (Austin, TX; www.cyberplus.com)

CyberPlus is a supplier of Internet-based knowledge management tools for the healthcare industry. CyberPlus markets Internet-based knowledge management tools for improving the effectiveness of healthcare operations for providers, payers, pharmaceutical companies, consumers, and Internet content providers. The management tools include: Cyber+View, a database that instantly aggregates healthcare data for decision-makers; EmSTAT, a tool that electronically tracks and charts emergency department activity; and Cyber+LE, a software application that allows healthcare institutions to implement automatically standardized medical terms.

Daou Systems, Inc. (San Diego, CA; public co; www.daou.com)

Daou Systems is a provider of integrated Information Technology solutions and services to the United States healthcare industry. The company's capabilities range from up-front consulting to information technology system design, implementation and long-term tactical support. Daou Systems' offerings include data, voice and video networking, applications consulting and implementation, as well as operational and Internet solutions.

In February 2000 Daou Systems formed a new eBusiness subsidiary, Enosus™, Inc. to provide end-to-end Internet professional services and solutions to healthcare and other commercial organizations executing eBusiness strategy. Capitalizing on Daou's core competencies of data, voice and video integration, Enosus™ will provide clients with unified eBusiness solutions that leverage Internet technology into a competitive advantage. The Enosus™ end-to-end service offerings will consist of up-front strategic consulting on potential Internet applications and market opportunities for a client's business, complete engineering services necessary to implement the client's eBusiness strategy and integrate back-end operations, and operational support including hosting, system monitoring, security, technical support, and maintenance.

Datatrak International Inc. (Cleveland, OH; www.datatraknet.com)

Datatrak International is a worldwide application service provider (ASP) in the electronic data capture (EDC) industry. The company supplies a suite of EDC software products known as Datatrak EDC™ and related services to the pharmaceutical, biotechnology, and medical device industries. Datatrak EDC™ was

Gene Logic Inc. (Gaithersburg, MD; public co; www.genelogic.com)

Gene Logic is collecting and commercializing a comprehensive survey of gene expression in human and animal tissues. The company tailors its gene expression information products to create customized solution sets mapped to a variety of market segments, as well as to the needs of individual customers in the pharmaceutical, biotechnology, healthcare, and life sciences industries.

As of early 2000 Gene Logic's premiere product line, the GeneExpress™ reference database, was used to discover and validate novel drug targets, develop therapeutic compounds, and facilitate clinical trials and patient management. The databases contain truly functional genomic information, based on the company's collection and analysis of normal, diseased, and drug-treated tissues, as well as the underlying clinical data. Gene Logic believes its GeneExpress™ database suite will become a fundamental reference source of gene expression information for many scientists engaged in industrial and academic biological research.

Because Gene Logic's information is distributed over the Internet, the company is establishing a portal to create multiple e-commerce promotional and transactional revenue opportunities. These may include the promotion and sale of third party products, such as custom gene chips, research reagents, and specialized genomic diagnostic products.

General Electric Company (Fairfield, CT; public co)

General Electric (GE) is one of the world's largest and most diversified industrial corporations. GE's services include computer-related information services.

GE Medical Systems is a $6 billion global leader in medical diagnostic equipment and services, including computer tomography, magnetic resonance, ultrasound, conventional and digital x-ray, patient monitoring, and diagnostic cardiology, and healthcare information management.

GE Healthcare Financial Services goes beyond the financing of GE Medical Systems equipment. The company was formed from the healthcare financing group of GE Capital and the financing teams of GE Medical Systems. GE Healthcare Financial Services include: lines of credit, operating and full service leases, term loans (fixed and floating), installment financing, tax-exempt financing, sale-leasebacks, revolving credit facilities, equity investments, and specialty real estate financing.

In January 2000 GE was in the process of acquiring MECON, Inc. (San Ramon, CA). MECON is a provider of benchmarking solutions to the healthcare industry. The solutions consist of data/incormation products, decision support software and value-added services. The principal focus of these products and services is to reduce costs and improve efficiency and effectiveness of departmental and clinical operations in the healthcare delivery system. The company's main product line is based on a database containing cost and key performance information from hospitals nationwide. In addition to statistical data, the database incorporates qualitative data derived from operational profiles provided by hospitals that utilize MECON's database-related products. Customers use the information provided to develop and implement strategies to reduce costs and measure periodically actual performance to maintain the cost reductions achieved.

In February 2000 MECON, Inc. was acquired by GE Medical Systems. In March 2000 MECON changed its name to GE Medical Systems Healthcare Solutions GEMSHS). The new name reflects the company's mission to revolutionize the healthcare delivery system through innovation and expansion of its core business as a leading provider of Web-based performance management and clinical value enhancement solutions. The acquisition by GE Medical Systems positioned GEMSHS to lead the healthcare information technology revolution by assisting customers in controlling costs and providing quality care. The relationship with GE Medical Systems is also facilitating the exploration of existing synergies between the two companies toward the development of a complementary platform to advance e-Health initiatives.

In March 2000 five major manufacturers of medical devices announced a plan to form an independent Internet-based company to make hospital purchasing transactions more efficient and cost-effective. The new company (not named at the time of the announcement) is described as a "healthcare exchange," and is being launched by Abbott Laboratories, Baxter International, GE Medical Systems, Johnson & Johnson, and Medtronic.

In June 2000 GE Medical Systems and EMC Corporation (a leading company in information storage) formed a collaboration to deploy a fast, scalable, highly reliable medical information archiving solution for GE Medical Systems' new application service provider (ASP) business. This is planned to be the first step in a tight alliance between these two industry leaders. The GE ASP solution is claimed to be the first of its kind to offer medical image archiving and Web-based distribution from mission-critical data centers using advanced information technologies. GE selected EMC as the information infrastructure supplier for the solution, which facilitates the flow of medical information digitally throughout the extended healthcare enterprise.

In October 2000 GE Healthcare Financial Services launched a comprehensive online financial and e-business site for healthcare providers. The new site is an advanced combination of customer driven features and tools designed for healthcare institutions, including an objective capital project analysis tool powered by Kaufman Hall.

GeneSage (San Francisco, CA; www.genesage.com)

GeneSage is an Internet-based health company dedicated to improving lives by providing genetic information, products, and services to healthcare professionals and consumers.

GeneSage Rx™ supplies healthcare providers with clear, comprehensive fact sheets on genetically linked conditions, access to genetic services and specialists nationwide and continuing medical education. Access to GeneSage Rx™ will be made available to physicians and nurses through group purchasers.

GeoAccess (Overland Park, KS; www.geoaccess.com)

GeoAccess is a supplier of online physician directories. The company provides technology for more than eight hundred clients, including managed care organizations, large employers, benefits consulting firms, and regulatory agencies.

Glebe Apothecary (www.glebe-apothecary.com)(www.feelbest.com)

Glebe Apothecary claims to be the leading e-commerce pharmacy in Canada.

In January 2000 Glebe Apothecary and Peachtree Network, an online food channel, launched the Peachtree Network Health Center. As a result, visitors to the Peachtree Network site can shop online for over-the-counter medicines, vitamins, and other health products and receive low cost home or office delivery.

Global Telemedix, Inc. (Westford, MA; www.globaltelemedix.com)

Global Telemedix is an e-healthcare application service provider that delivers high performance clinical collaboration over the Internet with its TeleConsult® software. Clinical data is captured at the point of care and uploaded to a central Web site enabling caregivers to create a multimedia medical record for consultation and collaboration that they can access anywhere and anytime. The company's mission is to improve healthcare delivery and information management by building virtual, subscription-based healthcare communities that provide clinical connectivity.

TeleConsult® is an e-healthcare application that enables physicians to consult and collaborate over the Internet with diagnostic resolution still images, video clips, and DICOM studies such as ultrasounds. Applications for enhancing physician productivity include consultations between facilities, grand rounds, and supporting physicians on call.

In March 2000 Global Telemedix announced that it had chosen Dell Computer Corporation to provide the computer systems to build both the Internet infrastructure that enables physicians to consult and collaborate with clinical information over the Internet and the company's computing infrastructure.

Go2Pharmacy, Inc. (Largo, FL; public co; www.go2pharmacy.com)

Go2Pharmacy, formerly known as Innovative Health Products, manufactures and packages private label dietary supplements, over-the-counter drugs, and health and beauty aids for companies worldwide. The company also develops and manufactures its own branded dietary supplements and health and beauty aids for distribution through various outlets.

Go2Pharmacy has expanded its business to launch an online business-to-business portal and a pharmacy benefit management division for institutional customers.

In April 2000 Go2Pharmacy formed Breakthrough Engineered Nutrition, Inc. for the purpose of marketing its own branded product line, Lean Protein. The company has introduced its first product under this product line, Lean Protein Chips, which it believes is the world's first zero carbohydrate, high protein snack chip.

and subsequently collect incoming bids. On the vendor side, CROs can access potential customers on a global scale and bid on desired projects with no sales overhead. The end result is a more efficient use of time and resources leading to improved business performance.

In November 2000 Inceutica and Pfizer formed an agreement to use Inceutica's electronic marketplace for the outsourcing of its pharmaceutical research and development initiatives. Under the terms of the agreement, Pfizer will post requests for proposals (RFPs) into Inceutica's marketplace, for a streamlined contracting process that reduces internal inefficiencies. The RFPs posted by Pfizer will be available for review by service vendors registered with Inceutica, allowing them to submit and revise project bids, monitor project status, and conduct ongoing dialogue directly with Pfizer representatives. Pfizer will have unlimited access to the site which will allow them to review all bids and select the vendor that best fits their needs. Inceutica will be responsible for automating and overseeing the RFP process without direct involvement in the parties' communications. Inceutica's Web-enabled service will reduce the time it takes to complete the RFP process. As a result, the efficiencies afforded by Inceutica will enable the industry to bring its products to market more quickly and at a greatly reduced cost.

Incyte Genomics, Inc.

In March 2000 Incyte Genomics announced the company's first e-commerce genomics program, LifeSeq® Gene By Gene. The new offering will give researchers access to Incyte's extensive collection of gene sequence data or physical copies of genes, one gene at a time.

InfoCure Corporation (Atlanta, GA; public co)

In December 1999 InfoCure acquired six dental practice management companies and formed a new Dental Division. The acquisitions included the dental business of National Data Corporation, the dental practice management software business known as PracticeWorks from Zila, Inc., Unident Corporation, InfoLogic, and Human Touch. With the completion of these transactions, InfoCure expected to have approximately a 16% market share of automated dental practices utilizing practice management software, and will become the third largest dental practice management company. InfoCure also indicated that its enhanced dental market share provides significant e-commerce and business-to-business opportunities as a by-product of supplying software applications that manage the administrative, accounting, clinical, and supply ordering activities electronically.

In February 2000 HealtheonWebMD and InfoCure formed a strategic agreement under which InfoCure will integrate HealtheonWebMD's Internet services with InfoCure's practice management systems currently serving 75,000 physicians.

Ingenium Corporation (Upper Marlboro, MD; www.ingeniumcorp.com)

Ingenium Corp. specializes in Web solutions and the development and management of highly secure communications networks. The company's systems integrate business strategy, operational models, and customer relationships into a framework of transaction privacy, assurance and security. Ingenium's vertical markets include healthcare, insurance, and government, with horizontal capabilities in secure Web solutions, secure enterprise systems management, secure telecommunications and eSecure consulting.

InnoCentive LLC (Indianapolis, IN; www.innocentive.com)

InnoCentive is involved in scientific research and development, building a global, incentive-based solution network in which a community of innovative scientists finds and solves challenging problems. With InnoCentive, leading science-based companies can expand research and development capacity by posting scientific challenges that need to be solved and connecting with talented scientists for the most innovative solution.

InnoCentive is an e-business venture of Eli lilly and Company.

Innovative Medical Services (El Cajon, CA; www.imspure.com)

Innovative Medical Services manufactures and markets water purification, measuring, and dispensing equipment used in pharmacies to reconstitute oral antibiotic suspensions (Fillmaster® pharmacy systems), and residential water filtration systems used in consumer markets. The company also markets proprietary filters for these products. The company's Nutripure® line of residential water systems includes a residential reverse osmosis water system available as either a convenient, compact unit easily installed beneath the sink, or as a countertop appliance requiring no installation.

In January 2000 Innovative Medical Services formed an alliance with Bergen Brunswig to develop a specialized e-commerce program for its new subsidiary, Nutripure.com. Nutripore.com provides an online, pharmacist hosted, Web site featuring select vitamins, minerals, and natural products as well as current health resource information for consumers. Because the profile of consumers who buy nutritional products matches that of consumers who buy water systems, the Web site will also include cross marketing programs for Innovative Medical Services' Nutripure line of water filtration system.

InServe Corporation (Charlotte, NC)

In January 2000 InServe formed a new subsidiary, known as iCorp.com, to provide workers' compensation rating, policy issuance, billing, claims, and workflow management systems through the Internet. The company will enable InServe products and services to be offered through the rapidly growing e-commerce marketplace. iCorp.com will also be able to serve as a "back office" provider of Internet services for other insurance companies, banks, affinity groups, and managing general agencies that are interested in offering workers' compensation products and services but choose not to purchase their own systems. In addition, iCorp.com plans to develop electronic data interchange capabilities to speed the transfer of billing, payment, prescription drug, and factoring information between medical providers and insurers.

InsWeb (Redwood City, CA; public co)

InsWeb operates an online insurance marketplace that enables consumers to shop online for automobile, term life, homeowners, renters, and individual health insurance, and obtain insurance company-sponsored quotes for actual coverage. The InsWeb Marketplace beings consumers and insurance companies together online, providing consumers with the insurance they need and insurance companies with the customers they want. InsWeb's service is free to consumers; its principal source of revenues is transaction fees paid by the insurance companies. InsWeb has combined extensive knowledge of the insurance industry, technological expertise, and close relationships with more than thirty-five insurance companies to develop a sophisticated, integrated online technology platform that delivers significant benefits to consumers and insurance companies.

InteliHealth (www.intelihealth.com)

InteliHealth, a joint venture between Aetna U.S. Healthcare and The Johns Hopkins University and Health System, is a health information Internet company. InteliHealth delivers content through its in-house editorial staff and via licensing agreements with broadcast, print, and interactive media.

Intelligent Medical Objects (Chicago, IL; www.imo-online.com)

Intelligent Medical Objects has a core team of physicians, software developers, and engineers with the mission to improve patient care by optimizing communication between patients and providers and to enhance provider and patient access to relevant medical information, services, and products.

Intertrials.com, Inc. (Horsham, PA)

Intertrials.com, Inc. is using the Internet to accelerate and improve the launch of clinical trials.

Intertrials received its first round of financing in January 2000. For over a year preceding that initial financing, the company had been building a database of investigators and providing access to that database and related start-up services to pharmaceutical and biotechnology companies.

InterTrials (Horsham, PA) changed its name to Acurian on June 21, 2000.

See Acurian.

IntraCom Corp. (Thousand Oaks, CA; www.intracom.net)

IntraCom develops Internet-based healthcare specialty applications for the medical community to improve the process of care delivery.

In February 2000 IntraCom announced its engineering release of MedEcho to transmit ultrasound images in real time over the Internet. Physicians are able to

access MedEcho images via personal computer and an Internet connection. The company plans to follow MedEcho with a line of other Internet healthcare specialty products and services that complete the Internet-based MedDesk suite of applications.

Intramedicine, Inc. (Westlake Village, CA; www.intramedicine.com)

Intramedicine, a subsidiary of Infinite Axis.com Inc., is a global source for integrative medicine for the healthcare, pharmaceutical, pharmacy, and natural product manufacturing industries. Intramedicine researches the full range of scientifically validated complementary and conventional medicine therapies available throughout the world and provides clinical data in support of how these medical disciplines work best in synergy to improve patient outcomes.

In July 2000 Intramedicine entered into a multi-year strategic partnership with CVS Corporation to become an integral part of CVS' internal pharmacist education program. Under the terms of the agreement, Intramedicine will provide CVS with access to its proprietary online integrative medical research database and to customized on-site professional training seminars. CVS will also feature Intramedicine's consumer information on its Web site. In addition, Intramedicine granted CVS an exclusive license in the chain drug store sector for use of its professional vitamin, mineral, herbal, and nutraceutical monographs.

In August 2000 Intramedicine acquired a Traditional Chinese Medicine (TCM) database, including six hundred TCM herbal monographs from several of the major TCM institutions in China. The acquisition was planned to merge thousands of years of Eastern medicine with Western medicine expertise. Each TCM monograph is fully referenced and translated and includes toxicity and pharmacology information. Each monograph will also identify all of the known active chemicals for each herb.

IntraMedX Corporation

In February 2000 CitX Corporation (Quakertown, PA) announced plans to spin off IntraMedX Corporation. CitX formed IntraMedX to provide secure subscription-based e-solutions to end users throughout the healthcare sector via a secure digital environment and the Internet. The core technology of IntraMedX is a user-friendly, network-centric Web-based software application platform. Subsequent to its original development by CitX, that company has developed and maintained Health Care Services and Information Network (HCSIN) as a private Virtual Private Network (VPN) and Electronic Community of Interest portal, which now serves more than 60,000 healthcare professionals throughout the United States. IntraMedX will leverage the current user base, as management executes its marketing plan to expand the use of HCSIN-trusted digital environment and related e-healthcare services.

IntraMedX Corporation, a February 2000 spin-off of CitX Corporation, provides subscription-based e-business solutions to end users throughout the entire healthcare sector, via a secure digital environment and the Internet. The company's core technology is a user-friendly, network-centric Web-based software application platform developed in 1989 by its founders and CitX Corporation. More recently, CitX has developed and maintained Health Care Services and Information Network (HCSIN), a private Virtual Private Network (VPN) and Electronic Community of Interest (ECI) portal which services more than 60,000 healthcare professionals throughout the United States. IntraMedX plans to leverage its current user base as company management executes its marketing plans

In April 2000 IntraMedX announced the launch of its IMX ECIP, an integrated Web-based tool and platform that enables healthcare organizations, hospitals, and insurance companies to create, deploy, and manage a comprehensive electronic community for its member physicians and healthcare professionals. The new offerings include customizable Virtual Internet Service Provider (VISP) and Virtual Application Service Provider (VASP) capabilities, enabling healthcare entities to create their own Internet Gateway and Virtual Private Network (VPN), giving them direct control over the type, quality, and integrity of information and services offered to their members, staffs, and partners.

Invida Outcomes Network (Highland Park, IL)

Invida brings significant and unique medical and personal value to consumers seeking greater control and empowerment as they cope with chronic conditions, such as arthritis, breast cancer, heart disease, and migraine headaches. It is an online resource that gives consumers access to disease-specific outcomes research to assist them in managing their care. Invida's patient registries will collect and interpret disease-specific outcomes data based on quantifiable attitudes and experiences provided by Invida members through online surveys. Invida will enable members to benchmark their clinical progress and quality of life in comparison to thousands of other patients with the same disease or condition.

Invida was created by Ovation Research Group, a leading global health economics and medical outcomes firm. Invida will draw on Ovation's research expertise to develop member surveys, interpret data and produce outcomes reports.

In May 2000 Invida that announced its consumer health Internet site is in the final stages of development and will be launched in August. It will produce unique aggregate data based on the health experiences of patients within more than one hundred disease areas.

iPhysician Net, Inc. (Scottsdale, AZ; public co)

iPhysician Net is a provider of applications that help pharmaceutical companies and physicians communicate via the Internet. The company's initial service is e-Detailing, which allows sales representatives to communicate with physicians in their offices via computer-based videoconferencing system provided to the physicians free of charge. The company also offers pharmaceutical, medical, and non-medical information, continuing education courses, and e-mail.

In February 2000 Axolotl formed a co-marketing agreement with iPhysicianNet, the interactive video-based e-detailing company. Under the terms of the agreement, the companies will promote each other's products and work together to provide a complete solution for physician offices.

iScribe (San Mateo, CA; www.iscribe.com)

iScribe was founded in January 1999 to eliminate inefficiencies in the healthcare system through the development of a pocket-sized wireless system to automate the process of prescribing drugs, capturing charges, and ordering laboratory tests. Physicians, pharmacists, pharmacy benefit managers, managed care organizations, and pharmaceutical companies will benefit from the use of the system, which will reduce significantly paperwork, safeguard the process of writing and filling prescriptions, and accelerate the billing and collection process.

I-Trax.com (Reston, VA; www.I-Trax.com)

I-Trax.com is a medical information systems and e-health company, dedicated to helping clients to deliver better, more cost-effective healthcare solutions to their customers. By specializing in patient-focused software systems and Internet applications for medical enterprises, the company offers a comprehensive integrated delivery network and integrated models of care capable of tracking any activity within the enterprise, from the simplest inventory requirements to the most complicated disease management systems.

iVillage Inc. (New York, NY; public co; www.ivillage.com)

iVillage.com, established in 1995, is a leading women's online network that provides practical solutions and everyday support for women between the ages of 25 and 54. iVillage.com is organized into branded communities that focus on issues of importance to women and provide interactive services, peer support, and online access to experts through sixteen content channels and several shopping areas.

In February 2000 Unilever announced that it was launching a new Internet company, backing a £125 million project with iVillage. At the time of the announcement, Charles Strauss, president of Unilever, indicated that the investment is fundamental to the company because 85% of its customers are women. Unilever has no immediate plans to sell online, but the company does hope to gain valuable marketing information about consumer needs by communicating with iVillage users. Also at the time of the announcement, it was disclosed that at least four million (mainly American women) visit the iVillage Website every month.

Johnson & Johnson

In March 2000 five major manufacturers of medical devices announced a plan to form an independent Internet-based company to make hospital purchasing transactions more efficient and cost-effective. The new company (not named at the time of the announcement) is described as a "healthcare exchange," and is being launched by Abbott Laboratories, Baxter International, GE Medical Systems, Johnson & Johnson, and Medtronic.

JustMed.com

See MedCom USA, Inc.

Veranto, Inc. (Redwood City, CA; www.veranto.com)

Veranto, founded in 1999, is an industry marketplace dedicated to the medical industry. Open to all segments of the industry, Veranto links manufacturers, distributors, providers, and group purchasing organizations, and integrates their business processes to streamline commerce. Veranto uses the Internet to create efficiencies within the current structure and relationships of the medical industry. There is no technology prerequisite for using the Veranto marketplace. It has architecture to integrate with both enterprise resource planning (ERP) systems and electronic data interchange (EDI), but works equally well as a stand-alone system.

As of mid-2000 Veranto had assembled broad industry support from 117 distributors, representing 50,000 providers and over 200 manufacturers.

Veritas Medicine (Cambridge, MA; www.veritasmedicine.com)

Veritas Medicine, founded in October 1999, is a comprehensive online medical resource developed to address the needs of patients, physicians, other healthcare professionals, and pharmaceutical sponsors, all of whom can benefit from a centralized and secure online resource that provides expert, reliable, and current information about clinical trials and innovative treatments. Veritas Medicine's resource matches patients and physicians against a database of 1,200 government-sponsored and pharmaceutical-sponsored trials and provides information about only the most relevant treatment options.

VHx Company

See Claimsnet.com

Viaken Systems Inc. (Gaithersburg, MD; www.viaken.com)

Viaken Systems is a full service application service provider for the life sciences, providing enabling solutions for biotechnology, pharmaceutical, and agricultural companies. The company hosts third party research informatics application solutions and e-commerce services at its tier one data center and delivers these services via the Internet. Viaken's services include arctitecture design, application and database hosting, distributed access to high performance computing, secure network management, and 24x7 system and application support.

VidiMedix Corporation (www.vidimedix.com)

VidiMedix provides "Network Medicine" solutions that address issues facing healthcare enterprises in delivering convenient, quality care to patients. As a participant in healthcare e-commerce, the company's solutions enable remote examination, diagnosis, and treatment of healthcare consumers by healthcare providers when direct, face-to-face interaction is inconvenient.

In January 2000 VidiMedix and Superior Consultant Holdings entered into a three-year strategic agreement to assist physicians in the delivery of quality medical care and patient education. Under the agreement, Superior will provide Digital Business Transformation™, Internet development, implementation, and support services to VidiMedix clients. The alliance is intended to participate in the growth of network medicine, in which computing devices, digital instrumentation, and the Internet work together to improve patient care.

Virtmed (Cambridge, MA; www.virtmed.com)

Virtmed is an information services company whose mission is to leverage innovative handheld computing and Internet technologies to help solve real healthcare problems. The company develops healthcare applications with both administrative and clinical utility that offer compelling economic benefits. Virtmed seamlessly integrates three domains - handheld computers, Internet technology, and existing healthcare information systems - to provide healthcare professionals with easy-to-use and comprehensive solutions that improve the quality of patient care.

In April 2000 Virtmed announced commercial availability of the Virtmed Charge Capture System, a handheld-based solution that automates the patient billing function. The system enables a healthcare provider to record immediately all billable events at the point of care by entering procedure and diagnoses codes into a handheld device through simple point and touch operations.

See PatientKeeper™ Inc.

VirTx Inc. (Camarillo, CA; www.virtx.net)

VirTx Inc. supports the newly emerging model of healthcare delivery now possible in the Digital Age by building Collaborative Medical Networks™ in partnerships with key influencers within the healthcare industry. The company's healthcare portal is designed to facilitate the exchange of multimedia, clinical data, and information, and to enable e-commerce globally among all constituents of natural-occurring healthcare communities throughout the continuum from health plan to consumer.

VirTx is a provider of secure Collaborative Medical Networks™. The name VirTx connotes the virtual treatment that occurs in the new carespace created at the intersection of healthcare and technology. Web-enabled, multi-media, clinical applications, including live-interactive video conferencing, are hosted via ASP to facilitate the emerging models for the delivery of healthcare in the Digital Age. The VirTx Collaborative Medical Network™ solutions support multi-media telemedicine and telescience collaboration, end-to-end across the bandwidth spectrum as well as the continuum of care, anywhere in the world. The VirTx solution set is flexible and scaleable, capable of supporting patient- and user-centric information access. This "bottom up" approach stands in contrast to historically rigid, technology-driven systems.

VirTx provides the Advanced (Clinical/Multi-Media) Electronic Data Interchange of the "front end" of e-MedSoft.com's management application suite, thereby completing the seamless support of healthcare delivery on a global basis. The VirTx-hosted applications support the actual practice of medicine, extending e-MedSoft.com's eHealthcare connectivity to the actual point of care.

In February 2000 e-MedSoft.com announced the execution of merger documents to acquire VirTx Inc. for restricted common stock valued at approximately $23 million.

See e-MedSoft.com.

Vitacost.com (Boynton Beach, FL)

Vitacost.com is an online wholesaler that provides detailed information on nutritional supplements, including vitamins, minerals, herbs, antioxidants, and nutraceuticals. The company offers these products to consumers at or below published wholesale cost, or between 33% and 75% below retail.

VitalRx.com, Inc. (San Diego, CA; www.vitalrx.com)

VitalRx.com offers an online health superstore with over 25,000 products, including health, beauty, and wellness products, prescription drugs, and home medical equipment.

VitalRx.com offers an eVitals™ service, a personal medical record application, to consumers and health professionals with the ability to store secure medical records online. In addition, physicians will be able to prescribe online with Docscribe™.

Vitamins.com (www.vitamins.com)

Vitamins.com, a Web-based marketer founded in 1997, offers vitamins, herbs, supplements, and natural cosmetics traditionally found in health food stores at 15% to 50% below store prices.

In January 2000 Alignis and Vitamins.com formed an affiliation. According to the terms of the agreement Alignis' members will receive additional discounts off the 15% to 52% price reductions already offered by Vitamins.com. Alignis' members will also have access to other services provided by Vitamins.com, including, On-line Health Encyclopedia, On-line Nutritionist, On-line Personal Trainer, and Vitamins.com Nutritional Newsletter.

On March 16, 2000 HealthCentral.com signed a definitive agreement to acquire Vitamins.com, a leading e-commerce provider of vitamins, minerals, and supplements. Vitamins.com had proforma net revenues of $30.5 million in 1999.

Medical & Healthcare Marketplace Guide, "e-Health: Health Information on the Internet" http://www.mhmgonline.com/articles/1538.pdf, January 21, 2002, as downloaded October 12, 2005 from http://faculty.fuqua.duke.edu/~willm/Classes/Pharma_BG/MHMG/m1538_eHealth.pdf.

Statement of
Vice Admiral Harold Koenig,
Medical Corps, U.S. Navy,
Surgeon General of the Navy,
before the Senate Appropriations Committee
on
Defense
1 April 1998
INTRODUCTION

Mr. Chairman, thank you for the opportunity to share Navy Medicine's 1997 accomplishments and plans for the future.

This has been an exciting year in Navy Medicine. On August 6, 1997, Navy doctors announced a breakthrough in organ transplantation. CAPT Dave Harlan and LCDR Allan Kirk, from the Naval Medical Research Institute in Bethesda, Maryland, were the first to successfully demonstrate a new medical therapy that appears to prevent the rejection of mismatched transplanted organs. That same day Navy medical personnel in Guam responded to the tragic crash of Korean Air Lines flight 801 which hit a hillside on approach to Guam International Airport with 254 passengers and crew aboard. Medical personnel from Naval Hospital Guam, and personnel from Naval units throughout the island responded and played a key role in saving lives. Of the 32 survivors of this tragedy, 19 were cared for in the Naval Hospital, many requiring intensive trauma care and emergency surgery.

This single day exemplifies the essence of Navy Medicine; the talented, professional healthcare providers ready to forge the future of medicine while responding in a moment's notice when our nation calls.

As I have said many times, Navy Medicine's primary mission is readiness. We meet our mission by ensuring our Sailors and Marines are fit and healthy. Navy Medicine, like civilian medicine, is making the transition from curative to preventive health care. As such, readiness means keeping our Sailors and Marines where they belong; healthy and on their jobs.

Navy Medicine's reach extends to remote areas of the world, aboard ships and submarines and in the air. Our Sailors and Marines depend heavily on Navy Medicine to meet their health and fitness needs wherever their missions require them to serve. This past year medical personnel deployed to serve around the world, from Haiti with the United Nations peacekeeping force to South America assisting with drug interdiction operations. In addition, Navy medical personnel were in Guam, Southeast Asia, Saudi Arabia, Africa, and Indonesia, providing medical assistance, training, humanitarian relief, and health services in the furtherance of national interests. Our medical personnel also worked in unison with Air Force and Army medical personnel providing superb cross-service support. We continue to look for opportunities to increase Tri-Service programs.

Navy Medicine's customer service focus is changing the culture of our system to one in which our products are judged by how well we satisfy our customers. I have made this a top

priority in Navy Medicine. It's an ongoing effort, one we will continue to refine in the coming years.

To help us better care for our customers, the men and women of Navy Medicine are developing innovative ways to keep our Sailors and Marines healthy, fit and on the job. We've had many successes in this area and as a result have made changes in the way we do business. These innovative changes are a result of Navy Medicine's focus on four goals:
(1) TAKING HEALTH CARE TO THE DECKPLATES;
(2) MOVING INFORMATION, NOT PEOPLE;
(3) MAKING TRICARE WORK; and
(4) RE-ENGINEERING OUR BUSINESS PRACTICES.

TAKING HEALTH CARE TO THE DECKPLATES

When I visit our men and women at Navy and Marine Corps bases around the world, I see many examples of health care at the deckplates. This means taking care of Sailors and Marines as close to their unit as possible so we can keep them on their jobs. It means providing care in mobile vans at pierside, in aviation squadrons, at base gyms, in barracks and in the operational field environment.

I see Navy sports medicine specialists taking health care to the field, resulting in timely health care and injury prevention. At Marine Corps Base Camp Pendleton, the Naval Hospital created a Sports Medicine and Reconditioning Therapy, or SMART, clinic which is located right on site where Marine recruits are training. Recruits and staff alike applaud this arrangement because it saves recruits a 42-mile round trip to the base hospital and reduces lost training time. In addition, the SMART clinics have been very successful in reducing injuries and decreasing rehabilitation time. At Marine Corps Base Camp Lejeune, North Carolina, our Naval Hospital has established injury prevention and rehabilitation services at the base gym where providers work with Marines to ensure safe exercise protocols.

Our Dental officers, too, are taking care directly to our Sailors and Marines onboard ships. Dental readiness is particularly important when ships are deploying because dental facilities are more limited at sea. To this end, we have set the goal for dental readiness of our active duty forces at 95% and ensure everyone onboard receive annual dental care, with special emphasis extended before deployments. The Dental center is living up to its slogan of "Fit to bite, fit to fight."

Deployment of our Medical Corps specialists on aircraft carriers has proven extremely successful. Last year, at the request of the fleet, a clinical psychologist was deployed with the USS KITTY HAWK and a physical therapist with the USS ENTERPRISE. Availability of professionals during the carriers' deployments demonstrated a substantial return on investment towards keeping Sailors and Marines on the ship and on the job. Additional deployments have confirmed the results and Navy Medicine manpower specialists are currently working with Pentagon officials to implement pre-deployment placement of clinical experts on all twelve aircraft carriers over the next four years.

Coordinating medical care for our deployed Sailors and Marines requires concurrent efforts by multiple people. The staff at our Naval Station Branch Medical Clinic in San Diego, California have done just that. The clinic has a fleet liaison program to coordinate with the 61 ships homeported in San Diego ensuring the crews' medical needs are met. Instead of waiting for the phone to ring, the fleet coordinator anticipates the

needs of incoming ships' personnel. Medical personnel on deployed ships are contacted a month before their arrival in San Diego and met by the fleet coordinator upon arrival, with appropriate medical appointments already scheduled. Not only does this help keep our Sailors on the job, but our customers are much happier with this personalized service.

MOVE INFORMATION, NOT PEOPLE

Along with taking health care to the deckplates, Navy Medicine is using technology to move information, not people, as we meet our readiness mission. I was very gratified during my visits this year to such remote locations as Diego Garcia in the Indian Ocean and to Guantanamo Bay, Cuba to see our medical personnel using technology to store and transmit medical information. Over the years, we became pretty good at moving people to Medical Treatment Facilities. We utilize an extensive medevac system that is complex to use, expensive to operate and takes our Sailors and Marines away from their workplace. As we move forward in the information age, using technology to move information rather than people has become part of our day to day life.

This effort has resulted in tremendous strides in learning ways to employ telemedicine and technology to our advantage. My favorite "good news" story concerns my specialty, Pediatrics. In Rota Spain, a two-year old's complicated case of pneumonia was managed using telemedicine techniques. The pediatrician in Rota was able to "electronically" consult with specialists at National Naval Medical Center Bethesda, Maryland, to determine the best treatment plan for the patient. In addition to improved quality, the use of telemedicine prevented a costly stateside medevac for this patient and his family.

Navy Medicine is also using technology to improve pharmacy services. At Naval Hospital Bremerton, Washington, a pharmacy technician, while revising the command's homepage, asked why couldn't they have a pharmacy refill request page on the Internet. He created one, and now their customers have an additional avenue to obtain pharmacy refills. Naval Hospital Sigonella, Sicily, is our second hospital to offer Internet refills, and we expect to offer this service at additional facilities in the next year.

Navy Medicine is using training exercises to incorporate technology into the operational environment. Kernel Blitz 97 (KB97), held off the coast of southern California in June, is an example. The medical portion of KB97 was designed to evaluate training methods used to prepare for our wartime mission, improve medical readiness, get the hospital ship USNS MERCY underway with the fleet, stand up a Reserve fleet hospital and test the augmentee manning of the amphibious ships.

Data on Personal Information Carrier (PIC) was used by the USNS MERCY, USS TARAWA, Fleet Hospital Operations Training Command, and the Surgical Unit ashore. PIC is the generic term used to describe any self-contained computer technology with personal data carried on an individual, resulting in all vital patient data being readily accessible to the medical team. During Kernel Blitz, a commercially available version of PIC, the Multi-technology Automated Reader Card (MARC), was used. The MARC contained patient information and algorithms for all casualty management, a record of clinical care, and required time for administering patient care treatment steps. The Military Health System (MHS) plans on deploying PIC technology to support active duty forces in the operational environment during fiscal year 1999.

We even have an on-line mentor program, known as the "Virtual Naval Hospital." The "Virtual Naval Hospital" is a digital health sciences library designed to provide naval health care providers access to current, authoritative medical information. It assists providers by providing information on about eighty of the most common medical problems at sea, common medical procedure descriptions, and the General Medical Officer Manual; thereby, improving quality of care. It also has a section for patients, where they can access information on first aid, consumer health products and twenty-five health topics on preventive medicine.

Technology has been applied to innovations that are great morale boosters for our people. The Telemedicine system operates on the same protocols as the existing site televideo conferencing systems throughout the Navy. Then when the system is not being used for medicine, it is a Quality of Life enhancement for the crew to communicate with loved ones ashore. The Naval Hospital Naples, Italy, staff created a program where pictures of newborn babies are digitized and can be forwarded through the e-mail system to the baby's father at sea or grandparents in the United States. With our Naples-based families being so far from their loved ones, this is a great way to help them share news of the arrival with their loved ones back home. Some Navy ships also have used Video TeleConferencing (VTC) to connect with our hospitals, allowing mom to talk to dad and letting him see the "new arrival" while he is deployed at sea.

Our ships are benefiting from, and making good use of, telemedicine. The medical department of the aircraft carrier USS GEORGE WASHINGTON has teamed up with the Telemedicine Department of the National Naval Medical Center in Bethesda, Maryland, creating the most advanced treatment facility in the fleet. Telemedicine enhancements proved very effective during the ship's latest deployment. Utilizing technology once exclusive to a fixed Medical Treatment Facility, the GEORGE WASHINGTON performed 39 "electronic" consultations with stateside medical specialists; 200 digital radiology procedures; and prevented six medevacs, saving over $26,000.

In the past, when faced with mental health issues at sea, the patient was often medevaced off the ship. During the first three weeks of the GEORGE WASHINGTON's deployment, medical staff performed five mental health exams using VTC. Shipboard medical staff transmitted the patient's mood, body language and response to questions to the hospital-based psychiatrist. Combining the VTC with the clinical history, the psychiatrists assessed the patient and recommended a course of treatment. Navy Medicine is working to make virtual mental health specialty care at sea a routine service.

On another occasion, the GEORGE WASHINGTON needed a radiologist to monitor a live ultrasound study. The patient had typical symptoms of acute gallbladder disease, but the physician was having difficulty confirming the findings and requested a specialist's help. Through VTC, the radiologist offered a differential diagnosis and clarified the imaging artifacts.

Needing an ophthalmologist, the GEORGE WASHINGTON again turned to telemedicine. They had a patient with an injured cornea complaining of vision loss upon waking. Within seven minutes of the original request, an ophthalmologist was examining the patient on the ship from over 5,000 miles away via satellite. This turned out to be a two-fold success story. The patient stayed on the ship knowing that he had received the best possible care; and, an unnecessary medical evacuation was avoided. As a result of this innovative technology, the sailor

was treated aboard ship and returned to duty within 48 hours of initial evaluation in sick call.

Telemedicine is not only effective on board ship, but has direct applications at our shore-based regional and remote medical facilities. Our health care providers at Naval Medical Clinic Annapolis, Branch Medical Clinics at Arlington Annex; Dahlgren, Virginia; and, Sugar Grove, West Virginia have used telemedicine for assistance in expediting care in the National Capital Area. Remote locations such as Naval Hospital Rota, Spain and McMurdo Station, Antarctica have also utilized telemedicine services provided by the Telemedicine Consultation Center in Bethesda. Expediting care for a complicated case of bacterial pneumonia in a two year old child; routine healthcare in evaluating Naval Academy midshipmen for history of nasal and sinus pathology; consultative follow-up and treatment of new and pre-existing skin lesions and pathology in the oral cavity; as well as cardiology support to the Independent Duty Corpsman for urgent care management of chest pain have all been demonstrated this past year. Telemedicine's potential as a time saving device in the day to day operations of Navy Medicine is readily apparent; along with its expanding capability to improve the overall quality of care rendered to our beneficiaries in remote areas.

MAKING TRICARE WORK

Our third goal is "making TRICARE work." Implementation of TRICARE is near completion, all contracts have been awarded and all regions are scheduled to be operational in the near future. With implementation complete, we will be able to meet our readiness mission while providing our beneficiaries choice, guaranteed access, and quality health care at the lowest out of pocket cost possible.

TRICARE is a profound and fundamental change in the way we provide health care services and, as with any change, is unsettling for our beneficiaries. The Services are working together to address key concerns of our customers: portability; improving access to care for geographically separated units; solving balance billing concerns; and, claims processing in order to make the system more customer-focused and user friendly. To further reduce confusion, Active Duty Family Members, who live within an MTF's catchment area, should be automatically enrolled in TRICARE Prime, unless they choose another option.

In addition, the Under Secretary of the Navy has appointed a task force headed by the Navy's Deputy Surgeon General to develop strategies for identifying educational techniques to simplify TRICARE and improve understanding. The task force is comprised of medical, line personnel and family members from the Navy and Marine Corps, who are actively exploring educational instruments, materials and methodologies for improving understanding of TRICARE.

Navy Medicine sees TRICARE education as a continuum throughout an active duty member's career. We plan on developing separate briefs targeted to the recruits in Navy and Marine Corps boot camp, when an individual reports to the first duty station, upon getting married, and when a couple has their first child. In addition, Navy Medicine is developing an information card for our active duty members outlining the procedures to use when seeking medical care outside of their normal duty station. We are also investigating methods to telemarket TRICARE through the Internet, and recommending the development of a national TRICARE hotline number to provide universal access to TRICARE information.

In July 1997, Navy Medicine initiated a TRICARE Customer Advocacy Demonstration Program. The intent of the project was to provide a location outside of the medical facility where beneficiaries could go to receive assistance in understanding TRICARE and problem solving. The base and medical facility commanding officers determined the actual location. Demonstration sites were opened in Bangor, Washington; Corpus Christi, Texas; Camp Pendleton, California; Jacksonville, Florida and Yuma, Arizona. Preliminary data demonstrates a very favorable customer response to this outreach effort. We are currently collecting data from the six-month demonstration project to evaluate possible expansion to other sites.

Navy Medicine is also playing a leading role in the development of TRICARE Prime Remote. TRICARE Prime Remote will involve the provision of care through a network of civilian primary care managers to Active Duty Service Members and their families living 50 miles or approximately one hour of driving time from a comprehensive Military Medical Treatment Facility. As Executive Agent for this program, Navy Medicine will support the development of a management process to oversee the health care of all members participating in this initiative. We are pleased with the potential of this initiative and expect it to improve health care access, uniformity of care, and quality of life; reduce time traveling to an MTF; and, decrease out-of-pocket expenses for our Service-members and their families.

In this process of restructuring our health care system, we are ever mindful we must not disenfranchise our Medicare-eligible beneficiaries. They remain our most loyal customers in military medicine. DoD believes the military can provide Medicare-eligibles health care at a lower cost than commercial at-risk HMOs and expressed the need to transfer Medicare Trust fund dollars to DoD (Medicare subvention) during the past decade. Landmark legislation passed in 1997 authorizes a 3-year demonstration of Medicare subvention. Titled TRICARE Senior, the demonstration project is authorized to be conducted at six military sites and will permit a specified number of our Medicare-eligibles to enroll in TRICARE Senior. Naval Medical Center, San Diego, California is the Navy's demonstration site. Following the MTF's application and acceptance into the Medicare program; a prescribed number of military retirees will be able to enroll into the TRICARE Senior Program. The target enrollment period is slated to begin this summer, with healthcare delivery beginning 60 days later. Navy Medicine is very excited about this new venture; and if successful, look forward to permanent legislation.

We realize Medicare Subvention is only a partial fix to resolving the "Broken Promise" of lifetime care for our retirees. Over half of Medicare-eligibles do not live near an MTF and are not likely to enroll in TRICARE Senior. Retiree groups are urging other alternatives to Medicare subvention for our retirees 65 and over. Presently, the Center for Naval Analyses (CNA) is conducting a study to improve options for access to care in the Military Health System (MHS) for these beneficiaries. This study is focusing on the possibility of offering the Federal Employees Health Benefits Program (FEHBP) as an alternative for those 65 and over. The other part of the CNA study will evaluate the feasibility of expanding the mail order pharmacy program to all Medicare-eligible beneficiaries, vice the current policy of providing this benefit only for residents of Base Realignment and Closure Commission (BRAC) sites. We expect to have CNA's report later this year.

The FEHBP option, known as FEHBP-65, is the most comprehensive and enthusiastically supported by the various

retiree groups. Presently not available to the military, FEHBP is a collection of health plans offered to federal civilian employees and retirees. FEHBP is paid for through monthly premiums, with the federal government subsidizing up to 72 percent of the premium. While we appreciate the merits of this system and its potential to ensure full health care coverage of our Medicare-eligible beneficiaries, Navy Medicine advocates the continued review and assessment of the cost and benefits of both FEHBP-65 and other alternatives to increase MTF access for our Medicare-eligibles.

CUSTOMER FOCUSED BUSINESS PROCESS RE-ENGINEERING

Navy Medicine continues to improve readiness by re-engineering our business practices. We are continually looking for new ways to do an even better job of keeping our Sailors and Marines healthy and on the job.

Recently the quality of Military Medicine has been called into question by various media reports. In response, Navy Medicine is working closely with the Office of the Assistant Secretary of Defense (Health Affairs) to reevaluate our system and processes. Be assured, Navy Medicine is strongly dedicated to providing the highest quality of care to all our beneficiaries and has taken specific actions aimed at refining and monitoring health care. We continue to participate in the Joint Commission on Accreditation of Healthcare Organizations accreditation process and are developing initiatives to improve our surgical procedures and clinical practices. Resolution of pending malpractice and adverse action cases with the National Practitioner Data Bank is aggressively being pursued. We are ensuring all Navy health care providers possess a valid unrestricted license. Navy providers with special Oklahoma licenses practice medicine under plans of supervision; none is practicing independently. To assist beneficiaries to make informed decisions on health care, a "report card" for each MTF is being created providing "on line" quality and consumer information; and, the feasibility of a shared decision making process between patients and providers regarding treatment plans and priorities is being studied. Finally, improved support to our providers is being enhanced through application of various automation tools and Internet services designed to produce the best possible outcome for all our patients.

In today's environment of scarce resources, Navy Medicine is very involved in several initiatives to collaborate and consolidate assets with other Services. Within the National Capitol Region, the National Naval Medical Center, Walter Reed Army Medical Center and Malcolm Grow Air Force Base Hospital have created Tri-Service psychiatry, pediatric, neurosurgery, neurology, neonatal intensive care, obstetrics, and substance abuse units. Not only are patients from all three Services routinely admitted to these units, but the units are made up of Army, Navy and Air Force clinical staff. Top administrative roles are also taking on a Tri-Service flavor. The Executive Officer at Naval Hospital Charleston, South Carolina is an Air Force Officer, while the Deputy Commander at Tripler Army Medical Center in Hawaii is a Navy physician. The Interservice Training Review Organization continues to move forward with the consolidation of training programs to ensure maximum utilization of our training dollars. To date 33 programs are currently consolidated or under consideration for consolidation including Physician Assistant, BioMedical Repairman, Nuclear Medicine, Cardiopulmonary and Hemodialysis technology.

Navy Medicine is an active member of the Joint Department of Defense (DoD)/Veterans Affairs (VA) Executive Council. This council is developing several initiatives designed to promote

cost-effective use of federal health care resources by minimizing duplication and underuse while benefiting both VA and DoD. Navy Medicine currently has over 100 facility-level Navy/VA agreements in effect including major medical and surgical services, laundry, blood, and laboratory services. Development of a DoD/VA formulary; joint development, assessment, insertion and use of telemedicine; and, integration of VA Networks and TRICARE Lead Agents offering more healthcare options to our beneficiaries are a few of the other exciting initiatives currently underway.

Navy Medicine is strongly committed to maintaining a quality Graduate Medical Education (GME) program. Our training programs ensure Navy providers are exposed to clinical experiences required to become skilled practitioners. GME Tri-Service cooperation is becoming more of a factor in ensuring the success of these programs. All three Services are now required to fill GME slots available in the other Services before out-service training is authorized.

Recruitment and retention of quality military physicians and dentists remains a priority. Within the physician community, surgical specialties continue to be the most difficult to recruit and retain and we currently have shortfalls in family practitioners, general and orthopedic surgeons. Physician specialty shortages are being addressed through the Financial Assistance Program which provides recruiting incentives for civilian physicians already trained in undermanned specialties and the Navy Active Duty Delay for Specialists program which allows graduating scholarship students to defer their active duty obligation until completion of their civilian residency. End strength shortfalls persist for our Navy dentists. In fiscal year 1998, legislation was passed to increase special pays for Dental Corps officers. These improvements, as well as increases in the number of Armed Forces Health Professions scholarships are expected to balance and stabilize the force structure of Navy Dentistry by fiscal year 2000.

To better meet the health care needs of our female Sailors, Marines, family members and retirees, Navy Medicine is taking some bold new steps in the area of women's health. As assignments for active duty women have expanded, so have the challenges and opportunities to re-evaluate Navy Medicine initiatives ensuring women are able to access the care they need. We have created a Women's Health Strategic Planning Group as part of a demonstration project addressing active duty women's health issues, including family planning, pregnancy counseling, breast care, parenting issues, sexually transmitted diseases and other women's health concerns. We want to create a comfortable, supportive and private environment for active duty women that will enable them to express their health care needs and concerns.

Our reengineering efforts are reaching all facets of Navy Medicine. The Navy's overseas research labs in Jakarta, Indonesia; Lima, Peru; and Cairo, Egypt, are vital to keeping our Sailors and Marines healthy when they visit foreign lands. Before our ships make foreign port visits or when they conduct military operational missions or exercise overseas, these labs ensure commands are fully aware of any potential health risks they will face not normally encountered within the United States. These labs also interact extensively with their host countries, fostering good will with the United States.

Navy research labs occasionally play an important role outside their normal duties. When a suspicious package was discovered at B'Nai B'rith Headquarters in downtown Washington,

D. C. this past April, scientists at the Naval Medical Research Institute (NMRI) in Bethesda, Maryland were called upon to assist the community. A letter accompanying the package claimed dangerous biological agents were present in the petri dish found inside the package. The FBI requested NMRI run tests on the dish and the gelatin-like substance also found in the package. Working through the weekend, NMRI personnel found no disease causing organisms, other than common environmental bacteria. Their hard work saved the day and the FBI's Assistant Director complimented the Navy for its prompt and efficient work in the incident.

CONCLUSION

In closing, I would like to reemphasize Navy Medicine's commitment to providing quality, cost effective health care to those entrusted to our care, be they in our hospitals, on foreign shores, at sea, or in harm's way. The beginning of the twenty-first century will continue to provide us new challenges and opportunities. Navy Medicine is responding to these challenges by emphasizing and building a state-of-the-art health care system and ensuring that the health and fitness of our Navy-Marine Corps team remains at the highest level.

On a more personal note, I will be retiring on June 30, 1998, 40 years to the day I took the oath as a Midshipman at the Naval Academy. It has been an exciting, challenging forty years. I would like to thank you for your outstanding support of Navy Medicine over the years. It has been an honor to share Navy Medicine's successes with you.

-USN-